

IFF

INTERNATIONAL FIRE FIGHTER MAGAZINE

REPORTING TO MUNICIPAL, INDUSTRIAL AND FIRE TRAINING PROFESSIONALS



Issue 45 • March 2015

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G-Force Nozzles: The Inside Story

Based on a highly customizable global nozzle platform design, the unique G-Force series of fixed, selectable, and automatic nozzles combine over 40 years of Task Force Tips design innovation and experience into true next generation firefighting tools. Manufactured exclusively at TFT's USA production facilities, the G-Force series is supported by an extensive infrastructure of 24-hour technical service representatives, on-line documentation, digital video training library, exclusive product serialization and tracking capabilities, and a proven 5 year product warranty. Incorporating unique performance components such as a stainless steel slide valve, inlet debris screen and protective fog pattern choices, the G-Force series delivers high performance and rugged dependability.

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G-Force

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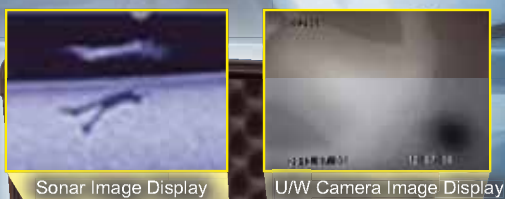
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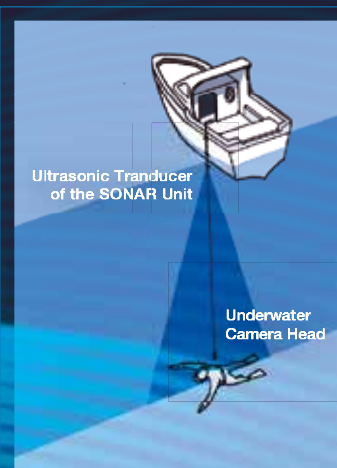
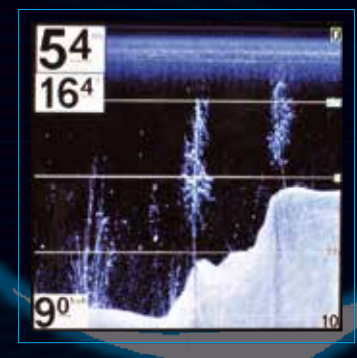
With the unique PROEYE 751-SNR SONAR Plus, operators can see sonar images from the SONAR System and real-life images captured by the Underwater Camera Head at the same time. The forefront technologies built into SONAR provides clear images even when searching the dark or cloudy waters of lakes and rivers.

The system is designed compactly for optional use for various types of search & rescue operations.

GPS System indicates exact location on the display.



SONER Display image



MARCH 2015 • ISSUE 45

Cover image: Aerial fire apparatus, when outfitted with high volume monitors and integrated valves offer a powerful tactical resource for large fires. Photo courtesy of Task Force Tips Inc.

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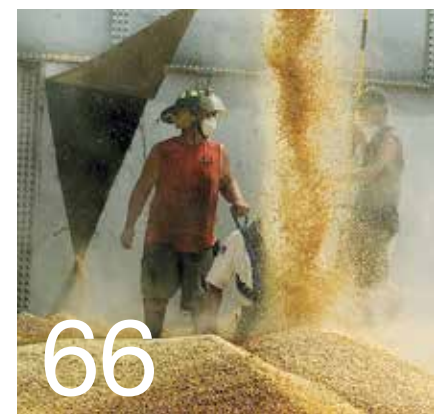
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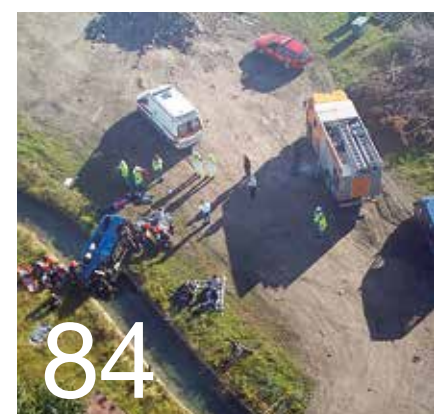
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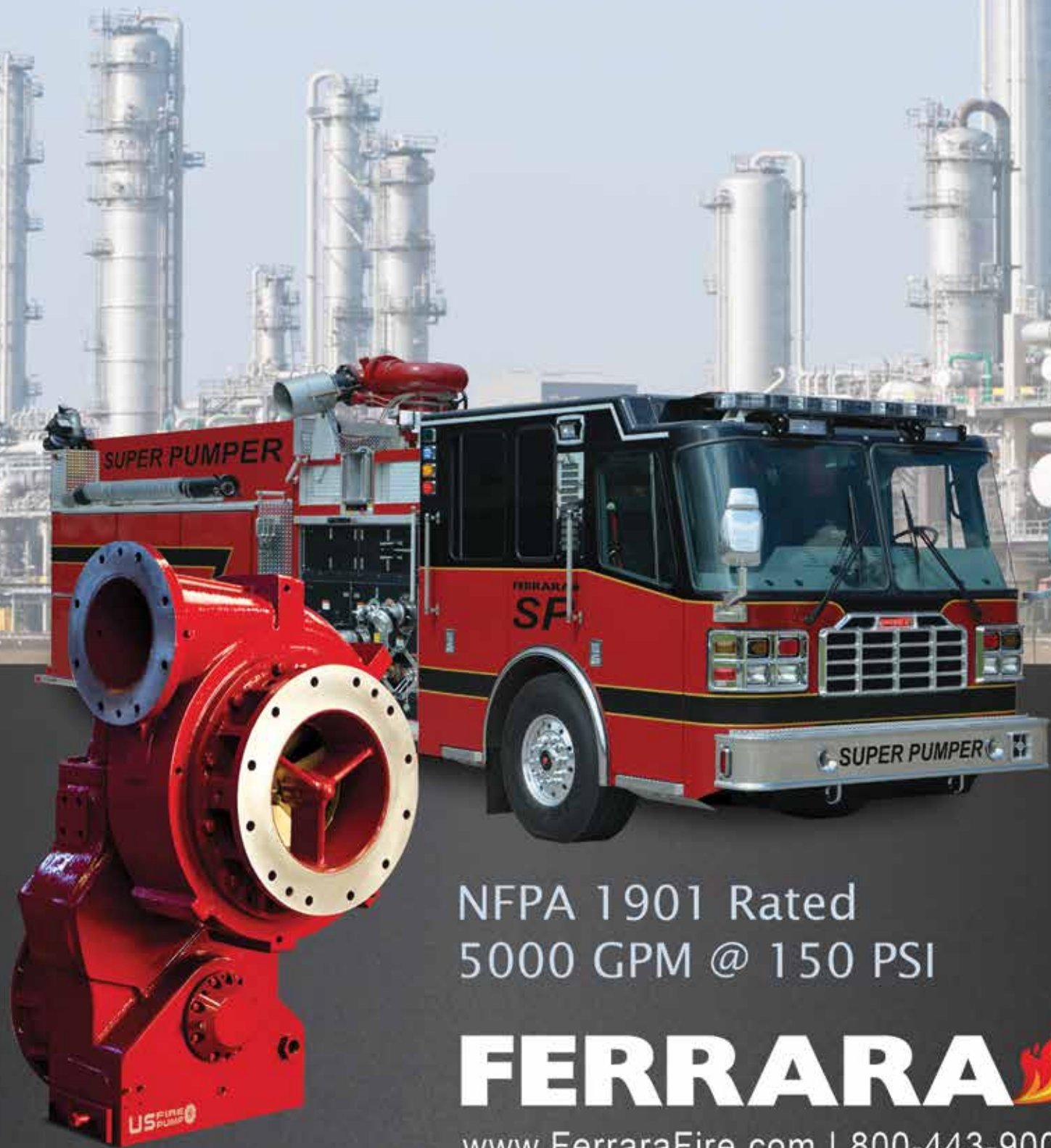
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Change and Opportunity – Are They One and the Same?



Paul Walker MSc

Paul Walker is currently the interim Chief Fire Officer for Cornwall Fire, Rescue and Community Safety Service. Paul originally moved to Cornwall in the role of Deputy Chief Fire Officer. His appointment in 2009 followed 20 years operational and managerial experience in Somerset County Fire Brigade, London Fire Brigade and Devon & Somerset Fire & Rescue Service.

Over the past 5 years Paul has led many change and improvement projects supporting the Service gain sector and partner recognition as a high performing service that embraces and delivers wide reaching and varied community safety prevention and response services across Cornwall.

As a leader in a Fire and Rescue Service I regularly hear the saying that 'the only thing that is constant is change'. Of course with the competing demands of public expectation against a backdrop of enforced budget reductions the need for change is a necessity not a choice. But if it is a constant is change a risk or opportunity?

Charles Darwin stated "It is not the strongest or the most intelligent of the species that survives but it is the one most adaptable to change." As a sector we have an incredible amount of collective intelligence, we have experience of change and we have plenty of opportunities to share good practice. With this in mind, and with the environment described above I would argue that the need for change does indeed present an opportunity, the risk would be not to change.

So where should today's Fire and Rescue Service be looking to position itself in the future? In the UK we have started to expand our role to deal with emerging operational risk such as water rescue and to some extent emergency medical care. As demand for acute care increases this latter role needs further exploration. However, these examples are about increasing the response to increasing demand. In my view our greatest opportunity may well be in seeking to reduce demand, whether that is in reducing the types of incident we have traditionally attended, or through a wider prevention role in areas of wider social need such as health.

As the Chief Fire Officer and Head of Service for Cornwall Fire, Rescue and Community Safety Service my responsibility extends beyond the traditional prevention role of the Fire and Rescue Service and includes anti-social behaviour, drug and alcohol action, road safety and domestic abuse and sexual violence. The drive for efficiencies has resulted in teams that traditionally had a specialist focus needing to adapt to deliver a wider remit embracing all areas of community safety. The result has been the opportunity to share the expertise and experience of highly skilled individuals to deliver a customer focussed approach to supporting safer communities.

In addition to structural changes, Cornwall Fire, Rescue and Community Safety Service have established close working relationships with a range of partners. The historic town of Hayle will shortly have a brand new and purpose built tri-emergency service centre which will be shared and staffed by personnel for the Police, Ambulance and Fire and Rescue Services.

Our integrated risk management plan had identified opportunities for changes to cover arrangements that

could improve our response to over 15,000 homes and business in the Camborne, Pool, Redruth and Hayle areas of Cornwall. A business case demonstrated that the combination of two existing fire stations to a more central location and the addition of a new fire station in Hayle would deliver an improved response service. Having identified this we met with our emergency service partners to determine whether opportunities existed to share any new facility and as a result the new build at Hayle has been designed and built to meet our shared needs.

The building itself will operate not only as a response hub but also as a community facility with a meeting room for public use. Whilst the building itself demonstrates positive shared working arrangements we also wanted to explore options for multi-functional staffing and the result is a pilot scheme where a single responder will have the combined skills to serve all three services.

The tri-service officer was appointed from Cornwall Fire, Rescue and Community Safety Service where he is employed as a Firefighter. He has undergone additional training to become a medical first responder on behalf of South West Ambulance Foundation Trust. In addition he will have completed elements of training to deliver the role of a Police Community Support Officer for Devon and Cornwall Police. This pilot post has attracted Central Government funding and we are delighted to have the opportunity to trial such an innovative approach which will truly provide the community of Hayle with a well trained and equipped emergency responder.

I am extremely proud to lead an ambitious workforce which is not afraid to consider change and the opportunities it may present. As I mentioned earlier, the collective intelligence of the organisation has generated many of our greatest successes. It would of course be naive to think that change will be embraced by all and I know that we must continue to engage and work with staff to ensure we communicate effectively. If we can continue to find solutions that suit the needs of our staff, our organisation and the communities we serve we will continue to be successful and a high performing organisation.

In conclusion I would agree that change is a constant. As an organisation we continue to seek new opportunities and in doing so I am sure the organisation will grow, adapt deliver change and improve. As a leader my role is to ensure I create and support an environment for change through working with staff and partners to identify the new opportunities as they emerge.



US Fire Pump

The Next Generation of Industrial Fire Pumps

Industrial fire departments across the world have been looking for better firefighting equipment with larger capacities and efficiency to control fires faster and reduce the risk to personnel and equipment. US Fire Pump has recognized that demand and developed a new High Velocity Pump system that focuses on increasing capacity and efficiency with existing engine capabilities.

The High Velocity Pump (HVP) is the largest NFPA 1901 fire pump made for mobile applications, reaching output up to 6000 GPM. The HVP is the ideal solution for fire trucks, mobile trailer units, compact skid units, and marine applications serving in industrial, oil-gas, marine, nuclear, military, or municipal environments.

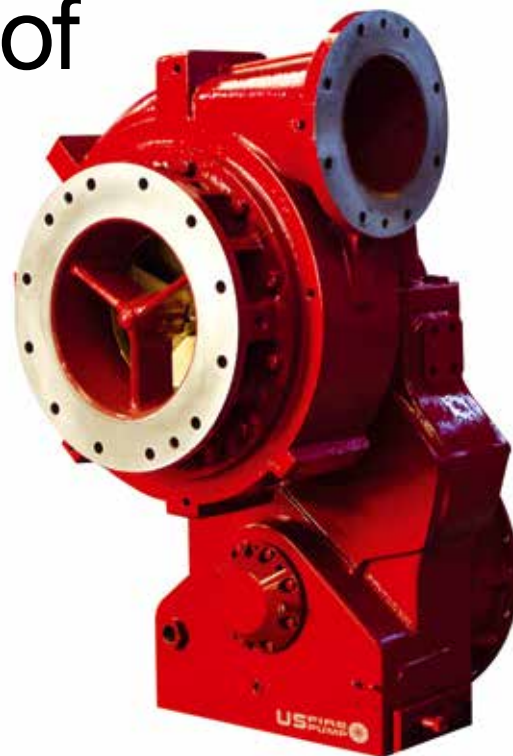
For many years, pumps have been made to maximize the pump capacity based on the available horsepower on the fire truck. Most pumps in the fire truck world were designed for the 500 HP engine and run efficiency levels in the high 60% to mid 70% range. Typically, an industrial fire truck has an engine that will generate 500 HP, which means these current pumps with their lower efficiency levels require this large horsepower for results of only 3000 to 4000 GPM. Even with the new 600 HP engine that are now available, the design limits of the existing fire pumps still only provides 3000 to 4000 GPM performance.

The HVP is changing the industry by running higher efficiency levels that can use the same horsepower and designing for the 600 HP plus engines. The fire truck is virtually unchanged; the engine, cooling system, cab, chassis, axles, and frame is unchanged. The pump is different and the plumbing suction is larger to handle the increased capacities. The HVP efficiency advantage allows for higher flows from a given engine size at all pressure settings, 150, 175 and 200psi, compared to other products commonly used for industrial firefighting applications.

The top end capacity of the HVP under positive suction is twice the closest competition. This means the fire ground risk assessment could be cut in half. With the HVP system, it only takes half the personnel and half of the equipment to produce the same firefighting power.

Not only is the High Velocity Pump affecting traditional industrial fire trucks, but US Fire Pump is also applying the HVP system to other engine driven industrial fire applications such as the mobile trailer unit and skid unit. Either one of these units can have a higher horsepower engine because it is not restricted by the space of a fire truck. The higher horsepower engines can drive the HVP capacities higher than any pump in its class, reaching output up to 6000 GPM.

On a skid or trailer unit, the HVP's compact size compared to other



industrial pumps in its class, makes these applications smaller and easier to manage. Both the mobile trailer unit and skid unit are built with the strongest materials and feature the HVP system. This optimizes high water flow through layout and design including a 12" flanged suction inlet feeding an impeller eye, which exceeds 10" in diameter with a discharge outlet of 8". The mobile trailer unit is mounted on a heavy duty trailer and can be deployed with just a 1 ton truck making it easy to use and extremely versatile.

Offering new industrial fire solutions that maximize performance, are easy to deploy, and built to last are key goals for US Fire Pump. With over 190 combined years of experience in design, engineering, and manufacturing of fire pumps and fire apparatus, US Fire Pump is a new collective determined to reduce risk to personnel and equipment by taking advantage of existing circumstances and developing the next generation of industrial fire pumps and applications. You can learn more about US Fire Pump and the High Velocity Pump system by visiting our website.



For further information, go to
www.usfirepump.com



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Scott Safety, a Tyco business, is pleased to announce that it has acquired privately-held ISG, a world leader in the design of advanced thermal imaging cameras. The combination of ISG and Scott makes Tyco one of the largest global suppliers of hand-held thermal imaging cameras, and further enhances Scott Safety's world-class portfolio of high-quality life safety products for first responders, military personnel, and industrial workers around the world.

"ISG provides an excellent strategic fit. This acquisition brings together two world-class companies with a shared focus on innovation, product quality, and customer support."

Andrew Chrostowski - President, Scott Safety

FOR MORE INFORMATION VISIT :
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FDNY Selects Intergraph's Public Safety Solutions

The Fire Department of the City of New York (FDNY) has selected **INTERGRAPH®** to update its incident response technologies. Intergraph's Computer- Aided Dispatch solution, I/CAD, and Mobile for Public Safety (MPS) will provide the foundation for dispatch and emergency operations for fire and emergency medical service (EMS) throughout New York City.

FDNY will also implement Intergraph's I/NetViewer and I/NetDispatcher to enable web-based communications between

dispatchers and personnel in the field. The department also purchased Intergraph's Business Intelligence for data reporting and analysis and EdgeFrontier® to simplify the development of interfaces between IT systems through the technology implementation process.

"FDNY is one of the largest and most respected emergency response agencies in the world. Its members are sworn to not only protect life and property, but also to protect critical infrastructure of global

importance," said Bill Campbell, senior vice president, Americas, Intergraph Security, Government and Infrastructure. "We are proud to call FDNY our customer and to support such a prestigious agency."

FDNY is the largest fire department in the United States and is universally recognized as the world's busiest and most highly skilled emergency response agency, providing fire protection, search and rescue, pre-hospital care and other critical public safety services to residents and visitors in the five boroughs of New York. The department has 10,500 fire personnel, more than 3,700 EMS personnel and runs more than 500 Fire units, and 1,000 Municipal and Voluntary EMS tours daily. In 2014, dispatchers processed and Fire Department personnel responded to a record-setting number of emergency calls in excess of 1.6 million.

More than 2,500 public safety and security agencies around the world rely on Intergraph software.

➔ For more information, go to www.intergraph.com/publicsafety/



New hose reel design by Holmatro

HOLMATRO launches a series of new CORE Technology hose reels, equipped with a foldable handle for hose winding. This handle folds out and locks in one step, so it's easy to use. During storage it can be folded in again to save space in your rescue vehicle.

The new hose reels are available on all our SR 31/32 and SR 41/42 Spider Range pump models, including CORE hoses of 15 or 20 m / 50 or 65 inches. They also come separately, as single or double hose reels, with CORE hoses of the same length. These single and double hose reels are equipped with soft-grip carrying handles and a brake system that prevents accidental unwinding of the hose(s).

About CORE Technology

Traditional twinline or dual hose systems work with two separate hoses: a high-pressure hose to supply hydraulic oil to your rescue tool and a low-pressure hose for the oil return to the pump. Holmatro's CORE system only has one hose, which is actually a high-pressure hose inside and protected by a low-pressure hose. Being para-aramid fiber reinforced, a CORE hose is lighter than traditional steel reinforced hoses and also does not have the risk of kinking or pinholes. It comes with an easy to clean flat-faced coupler at both ends which locks automatically in just one push. Holmatro introduced this technology back in 2005 and since then it has become the new standard for rescue equipment in many parts of the world.

➔ For more information, go to www.holmatro.com



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THE FLOATING WATER EDUCTOR

Use as a portable fire hydrant system. Requires as little as 3' of water such as rivers, creeks, ponds or swimming pools.



THE WATER EDUCTOR

The Water Eductor can be used with or without float in rivers, creeks, ponds or swimming pools.

Charity Cyclists Rise to the Challenge

Dozens of cyclists clocked up over 2,000km for charity in a 24-hour bikeathon inspired by a tenacious firefighter's year of endurance challenges.

Royal Berkshire Fire and Rescue Service's (RBFRS) gym at the Calcot headquarters was a hub of activity from 10am on Monday, as firefighters from Berkshire and Oxfordshire, support staff, charity representatives and a Royal Berkshire Fire Authority councillor all jumped on bikes to support the cause.

The Team 15 event was inspired by Slough firefighter Andy Grist's 14 Challenge, which concluded with a 200-mile marathon in December. Andy completed 14 arduous physical challenges in 2014 for The Fire Fighters Charity and the Make-A-Wish Foundation, a feat made all the more remarkable given he'd been diagnosed with diabetes just months before.

Two bikes were kept running for the full 24 hours during the Team 15 challenge by an RBFRS team, including Andy Grist, and

an Oxfordshire Fire and Rescue Service team. A friendly rivalry developed on the day, with the Berkshire team completing an impressive 782.7km and their Oxfordshire peers managing a fantastic 721.95km.

Around 30 supporting charity cyclists hopped on and off four neighbouring bikes in draining 30-minute slots across the event and pedalled a combined 603.01km.

Chief Fire Officer Andy Fry said: "Andy has been such an inspiration during his 14 endurance challenges that we all wanted to be by his side for a fitting 15th.

"It brought me great pride to see the generous and energetic spirit of RBFRS unleashed for two deserving causes and I'm sure there will be many more examples in the future as we settle into Newsham Court. It is an outstanding achievement to reach 2,000km in 24 hours and great to welcome Oxfordshire Fire and Rescue Service to the challenge.

"I would like to offer special thanks to ServiceSport, who generously loaned us five exercise bikes to make this event possible, and I hope this experience will encourage more RBFRS personnel to take advantage of our excellent gym facilities."

 More information, go to www.rbfrs.co.uk



Peli Introduces Rechargeable Lantern

PELI PRODUCTS proudly announces the launch of the 9415Z0, its most powerful handheld light in the market with the highest Safety certification, ATEX (Zone 0, Cat.1).

With only 1,65 Kg of weight and 392 lumens, the new 9415Z0 LED Lantern packs the power without the weight. Four LEDs, powered by the latest generation Ni-MH batteries illuminate a distance of 392 meters. Innovative features include:

- Approvals: II 1 G Ex ia IIC T4 Ga
- 120° rotating head i Run time: 11h (low) / 4h 30m (high)
- Battery status indicator i 3 mode switch (high, low, flashing)
- Rechargeable battery
- Shoulder strap included

Safety approved for the most volatile work areas, the 9415Z0 LED Lantern is safe and one of the most compact, high output lanterns on the market. With an ATEX Certified Category 1 (Zone 0), it can be used at the highest risk zone where an explosive atmosphere is expected to exist, especially in chemical, electrical, gas, oil, power, pharmaceutical, fire rescue, hazmat and other high-risk industries. It also features a sure-grip, all-weather handle and an extra-large space to accommodate gloved hands. The light is available in yellow and is backed by Peli's legendary Guarantee of Excellence.

 More information, go to www.peli.com



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What's New with Gloves and Helmets

With firefighting and rescue operations becoming ever more challenging, the leading helmet and glove manufacturers are continuing to introduce new and improved products, often tailored to particular fire or rescue challenges and environments. They all share the same vision: improved safety, wearer comfort and long service lifetime, as this review of the latest offerings shows.

Seiz

In three attractive models, SEIZ® offers a whole family of technical assistance safety gloves at the same time. In addition to their ergonomic fit, excellent tactile sensitivity and high dexterity, all gloves have a KEVLAR® inner lining, offering powerful cut protection from the cuff ends to the fingertips. The gloves also have an extremely secure grip and are resistant to abrasion and punctures. The wrist seal uses an elastic rubber band, preventing coarse-grained particles and glass splinters from getting inside. The attractive yellow-red design improves the wearer's visibility when working at night. The individual models have additional protective functions. For example, SURVIVOR offers a black fabric with a highly abrasion-resistant granite coating on the palm, a phosphorescent yellow NOMEX® honeycomb fabric on the rear and a blood and bacteria-resistant CROSSTECH® membrane. The X-RESCUE has a three-layer, watertight palm and carbon knuckle-protectors, while in SUPPORTER-II the knuckle protectors are placed below the tough exterior.

➔ For more information, go to www.seiz.de



Vimpex

Vimpex, the specialist supplier of emergency services equipment for over 20 years, has launched a new advanced firefighter glove. The FX-1 MAX represents the latest and most modern development in firefighting gloves in recent years and uses PBI MAX – the strongest and most flexible outer shell fabric in the world.

A unique solution to firefighter hand protection, FX-1 MAX gloves feature pre-curved fingers and hand shape offering unmatched dexterity and fit whilst delivering extremely high levels of protection against radiant and contact heat, mechanical protection and cut / abrasion resistance. Thanks to their construction from PBI MAX, which has three times the filament rip stopping power of other fabrics, FX-1 MAX offers the firefighter an ideal replacement to leather gloves. They also avoid the stretching associated with leather as well as the danger of rapid shrinkage in high heat.

Finger tips, inner fingers and palm areas are protected with high strength silicone coated Kevlar® reinforcement to further enhance the FX-1 MAX performance during firefighting. Another significant advantage of the FX-1 MAX glove is the fact that it can be laundered along with the rest of the turnout gear.

➔ For more information, go to www.rescue-tools.co.uk

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US FIRE PUMP



MOBILE FIRE POWER

Easily take the fight anywhere with the Mobile Trailer Unit from US Fire Pump. Mounted on a heavy duty trailer, this pump system is quick to move and easy to deploy with just a 1 ton truck. Small and compact, the MTU packs a massive punch with the USFP 6000 GPM High Velocity Pump, providing large water flow for any situation.

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Helmet EOM

EN 16471:2014
For wildland fire fighting
EN 16473:2014
For technical rescue
EN 12492:2012
For mountaineers

For 30 years Sicor has been developing, manufacturing, and supplying the best helmets for the protection of many prestigious Fire Brigades in the world.

Helmet VFR EVO

EN 16471:2014
For wildland fire fighting
EN 16473:2014
For technical rescue
EN 443:2008
For fire fighting in buildings and other structures

Glovecrafters

The Fire Armor is true three-dimensional form fitting glove with a curved finger design, inset thumb with enhanced finger dexterity.

The one piece back shell is made from FR and water repellent 100% Kevlar knit fleece 7.5 oz. fabric with exceptional flexibility across back of hand. A non-restricting Eversoft® leather knuckle band is sewn across back for added knuckle protection. Elastic is sewn into wrist crease for close fitting cuff. The back is lined with a layer of 6 oz. modacrylic non-melting and non-dripping liner.

A double-backed 3mm Pryotect Barricade moisture barrier is breathable, 100 % water proof, viral/chemical penetration resistant, and provides blood borne pathogen protection. The barrier extends full length of glove for complete protection. The 6 oz. 65% Kevlar® and 35% Nomex® stitch bonded FR liner insulates the inside back of hand.

Five separate finger fochettes have curved and form fitted cut from 3.5 oz. to 4 oz. black Flexor cowhide tanned to meet NFPA flame test for the highest finger dexterity. Special breathable adhesive is coated over entire finger, thumb and palm area, ensuring full liner/barrier/glove adhesion meets NFPA requirements for liner retention.

The palm is made of one piece 3.5 to 4 oz of Eversoft cow leather tanned to meet NFPA flame resistance test and treated with additives to stay soft when wet with low water absorbance during repeated soakings. The thumb is two piece inset into palm to provide unrestricted movements of the thumb right to left.

The glove liner has a 2 inch grain leather cuff sewn inside glove wrist over top of the liner for the gauntlet model and bond with 1.5 inch black FR binding to finish cuff.

The wristlet model is fitted with a 4" Black Nomex® cuff with leather pull patch and hang up loop. This glove is sewn completely with 30/3 Kevlar® thread and is certified to NFPA 1971-2013 by the Safety Equipment Institute (SEI).

For more information, go to www.glovecrafters.com



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Bristol

In a further extension of its own-manufacture product strategy, Bristol has designed a range of three structural firefighting gloves to meet EN659:2008 and which have focused on providing class leading protection and manual dexterity.

The new gloves, which have been designed by Bristol's in-house design team as part of Bristol's New Product Development Programme (BNPDP), have been fully tested by UK firefighters before going into production and will be available in three different fabric combinations. A robust development programme included extensive trials on alternative material combinations as well as the cut, finger shaping and overall dexterity of the fire gloves.

The first product will be available from the autumn of 2014, which is an all-black, soft, flexible leather design incorporating a Gore CROSSTECH® membrane with a Kevlar lining. Special features include silicone finger and palm grips and a knitted Nomex® cuff.

Two other gloves in the range, which will be available in 2015, will incorporate Hainsworth TITAN® fabrics – the former using TITAN® PBI 1260 and the latter a TITAN® 1220 in red. In common with the leather glove, these both include a Gore CROSSTECH® membrane with a Kevlar lining. Identifying features include silicone palms, reflective piping, knuckle protectors and knitted NOMEX® cuffs.

Roger Startin, Bristol's joint managing director said, "This new fire glove range is further evidence of our long term plan to use our in-house design experience and capability to bring more own-manufactured firefighter PPE products to market beyond our traditional ranges of specialist coats and trousers."

For more information, go to www.bristoluniforms.com





FX-1 MAX

Firefighter Glove

FX-1 MAX Gloves use PBI MAX - the strongest and most flexible outer shell fabric in the world. They feature pre-curved fingers and hand shape offering unmatched dexterity and fit, whilst delivering extremely high levels of protection against radiant and contact heat, mechanical protection and cut / abrasion resistance.

PBI MAX has three times the filament rip stopping power of other fabrics offering an ideal replacement to leather gloves. FX-1 MAX Gloves avoid the stretching associated with leather as well as the danger of rapid shrinkage in high heat. They can also be laundered along with the rest of the turnout gear.

Suppliers of PPE, Technical Rescue Equipment and Lighting for Fire & Rescue, Police and Military.

www.rescue-tools.co.uk

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VIMPEX
Advancing Rescue Technology

ESKA

The ESKA Flash Pro is known as all-rounder for technical rescue. The glove offers optimum cut protection and excellent grip and tactility even on smooth surfaces. The hard-shell knuckle protector additionally provides optimum impact and knock protection. The material Rescut™ Fire protects not only the wearer but also the glove. The cut protection barrier is the outer material. The back of hand material is flame retardant and offers protection against flying sparks and electric arcs.



For more information, go to
www.eska.at

Leader

The LEADER Sar is the ONLY true multi-use helmet in the world!

LEADER Sar has been designed to meet the highest levels of protection combined with the highest possible levels of comfort and usability!

Lightweight and comfortable, the helmet offers a high level of impact protection which gives the wearer excellent protection from impact/shock both from above or from the sides.

The LEADER Sar all risks Helmet is suitable for many applications. It is tested to eleven different standards giving it the versatility to be used in a wide range of applications including:

- Search and rescue / Confined Space / CBRN environments
- Water rescue / Swift Water / Marine / Ribs / Hovercraft
- Forestry fire fighting
- Ambulance / E.M.S
- Wildland fire fighting / General area search
- Maritime Rescue / Coastal Border Security
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Sicor, an ISO 9001 certified company, is one of the world's leading producers of helmets for fire fighting, structural and wildland, technical rescue and rescue in mountains and from height.

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The high quality standard qualities are assured by the company's modern laboratory and the twenty-year collaboration with the Italian and International leading test and certification laboratories.

Sicor invites you to visit them on Stand F48 in Hall 12 at the Interschutz exhibition where they will be officially introducing their new helmet. The VFR EVO is certified to EN 443:2008 for fire fighting in buildings and other structures, EN 16471:2014 for wildland fire fighting and EN 16473:2014 for technical rescue. It will be also presented the new version of helmets model EOM and EDL 01 AIB, certified according to EN 16471:2014, EN 16473:2014 and EN 12492:2012 for mountaineers.

For more information, go to
www.sicor-sureco.it



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Pacific Helmets (NZ) Ltd combines safety, comfort, quality, and style through the new Pacific structural firefighting helmet, the F10 MkV. With a Kevlar® and fibreglass composite shell, the F10 MkV is incredibly light and, like all Pacific Helmets, is designed to last you a lifetime.

The new shape and low ride height enhances the balanced feel of the helmet while utilising the latest chinstrap, headband, and liner designs from Pacific Helmets to provide you a comfortable fit over long periods of wear. Features available include the One Touch Eye Protector; Bubble Face Shield; Neck Protectors in various shapes, colours, and designs; Easi On/Off Bases for torch attachment; rear hanger; BA mask clips; and front plinth. Customised reflective trims and decals are available to make the F10 MkV fit your brand.

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INTERSCHUTZ 2015

Interschutz 2015 Profile & Showcase

Fire fighting, disaster relief and rescue: these are the main pillars of INTERSCHUTZ 2015. This flagship fair not only boasts a rich tradition in firefighting, but for many years has also been covering a whole lot more ground.

From 8 to 13 June 2015, the gates will once again be opening on the world's most renowned exhibition for rescue workers, firefighters and related professionals – an unparalleled showcase of the latest equipment and innovative approaches to emergency rescue. Some 1,300 companies from 46 countries will be presenting their cutting-edge products and services in Hannover, Germany.

As the leading international event for firefighting and disaster relief, INTERSCHUTZ puts the spotlight on the technologies of tomorrow.

Fire Fighting

All methods of firefighting rely on starving the fire of one or more of the three things it needs in order to keep going – heat, oxygen and combustible material. In that sense, nothing has changed since the days of Ancient Egypt. What has changed is that modern firefighters are a lot more systematic in the way they go about their job. They don't just eliminate the immediate danger; they keep a watchful eye on downstream risk and damage as well. Consequently, modern fire call-outs are a lot less spectacular than in the past.

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That's because speed is not the only requirement; getting fires under control also calls for careful consideration – a measured approach that may sometimes appear slower and more deliberate, but which gets the job done more effectively.

Discover for yourself just how effective today's fire-extinguishing technology can be at INTERSCHUTZ 2015. In halls 13 and 27 and on the open-air site, fire protection specialists from over 40 nations will showcase their innovations and world-firsts in fire protection and firefighting technology.

Main themes

- Vehicles and vehicle equipment
- Equipment for fire stations and workshops
- Associations, organizations, service companies

Disaster Relief

At INTERSCHUTZ 2015, visitors will be able to witness the latest disaster relief and management technologies innovations first-hand. Disaster management mobilisations like these pose major logistical as well as technical challenges. Solutions for meeting those challenges – everything from rugged water purification equipment to innovative software for managing and coordinating disaster relief efforts – will be on show in the Disaster Relief display areas in Hall 26 and on the open-air site at INTERSCHUTZ 2015.

Main themes

- Vehicles and vehicle equipment
- Equipment for technical support and disaster relief
- Associations, organizations, service companies

Rescue

Rescue professionals, manufacturers of vehicles and medical equipment, and paramedics will be presenting the latest

and greatest of these in Hall 26 and on the open-air site at INTERSCHUTZ 2015.

In the emergency and rescue services, speed is obviously very important, but so too is having properly qualified and equipped personnel. Emergency and rescue professionals work closely with manufacturers of medical equipment and vehicles to continually optimize the care and service provided by first responders. At INTERSCHUTZ 2015, they will showcase their latest results.

Main themes

- Vehicles and vehicle equipment
- Rescue, emergency, first-aid, and (para)medical equipment
- Associations, organizations, service companies

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The exciting contest for the prestigious "Toughest Firefighter" title is back again in 2015. And this time we are looking for the world champion. Preparations are already in high gear.

Interschutz 2015 Product Categories

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- Fire extinguishing technology, agents
- Information and organization
- Measuring and detection apparatus
- Personal protective equipment
- Rescue, emergency, first-aid, and (para) medical equipment
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- Vehicles and vehicle equipment

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Scott Safety Breaking New Ground at Interschutz

INTERSCHUTZ

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Scott Safety, a global leader in the design, manufacture and supply of personal and respiratory protective equipment, will be exhibiting at INTERSCHUTZ 2015 to reveal leading new ranges of respiratory protection and gas detection products for those working in high risk industries (8th – 13th June, Hall 12, Stand D37).

Respiratory Protection

Adding to its respiratory protection offer, a brand new range of Self Contained Breathing Apparatus (SCBA) will be available at the show. The new ProPak SCBA range provides the ultimate in comfort, reliability and performance for those working in the emergency firefighting and industrial sectors. This lightweight set offers the highest levels of protection, while providing the wearer with ease of movement and comfort. The entire ProPak range has been approved to EN137:2006 Type 2, incorporating the stringent Full Flame Engulfment Test and has MED approval – the latest approval for the Marine industry.

The new ProPak range comes with a choice of 200 – 300bar cylinders, as well as the new high-pressure 379 bar cylinder technology. At 25% higher pressures than the current 300bar SCBA, the 379 bar cylinder offers significantly increased



duration with minimal increases in size and weight. At the size of a typical 60 minute cylinder, the new Scott Safety offering is able to provide a duration of 75 minutes breathing time.

Gas Detection

Scott Safety's expertise in gas detection solutions will also be showcased at INTERSCHUTZ with its new Meridian Fixed Gas Detector and the Protégé ZM Single Gas Monitor. Meridian, the first truly universal gas detector, is designed to support a full range of toxic and

combustible sensors and is unique in the industry in terms of its single detector head that will accept all sensor types as well as a single set of accessories, to make it simple to use and maintain. Scott Safety's Protégé ZM portable gas monitor is also available to provide an ergonomically designed hand-held solution to monitoring potentially hazardous levels of combustible gas, enabling the operator to focus on the situation at hand.

Thermal Imaging Cameras

The Eagle Attack thermal imaging camera from Scott Safety delivers all the performance, quality and durability that high-risk workers demand. Its high resolution design provides users with great image quality and functionality not normally available in lightweight imagers. Developed for on-the-job reliability, durability and ease-of-use, the Eagle Attack imager is one of the lightest and most portable imagers in the industry.



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POK is well-known for its hand nozzles, monitors and foam equipment. However today POK produces a range of more than 3600 products and continues to develop

two new items of equipment per week. This is possible thanks to its dedicated design team of experienced hydraulic and mechanics professionals.

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INTERSCHUTZ
2015



We deliver to fire departments and manufacture a large amount of equipment for fire trucks. Waste incineration plants use our remote control monitors. Water supply and sanitation services use our valves and strainers. Storehouses, petroleum refineries, fuel containers need POK's high expansion foam generators and very powerful monitors. We deliver to Navies our range of equipment specially tailored for the marine environment. We have specific hose reels for tunnels such as pneumatic mobile hose reels, or resistant to earthquakes for nuclear power stations. Our Gerico nozzle is used for grain silos. We manufacture all sorts of pumps designs, hydraulic motors for companies including DeLaval, Francis, Kaplan and Pelton. We have the answers for a multiple of applications that don't necessarily require the same technology.

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- **FDIC International - Stand #3377**
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- **INTERSCHUTZ 2015 - Hall 27, stand K43**
June 8th to June 13rd

Visit our website for more information
www.pok.fr



Improving Ice and Cold Water Rescue is a WISE Investment

Mark Bosse, chief of Poland (Maine) Fire and Rescue, recalls a dark night when his men repeatedly broke through the ice while trying to reach a victim 1,500 feet from shore. The rescuers, dressed in heavy gear, were physically drained from pulling themselves out of the icy lake time and again. Visibility was nil, and communications failed as radios became waterlogged.



Debbie Bolduc

Debbie Bolduc owns and operates BizBuzz Marketing Partners, a boutique marketing firm focusing on the needs of small to mid-sized businesses.

After successfully pulling the victim from the frigid waters, the men still had a long haul back to shore through the same crumbling ice. If not for the Game Warden's air boat meeting them part way, the outcome could have been very bad. "I feared my men might not make it back alive," recalls Bosse.

Solution

Despite an extensive search, it wasn't until Bosse attended the Fire Department Instructors Conference (FDIC) a few months later that he became acquainted with WISE Technology and the Amphibious Ice Rescue Responder (AIR Responder), a vehicle capable of carrying multiple people, up to 900 pounds combined, across solid and broken ice and open water. The vehicle virtually eliminates the risk to rescue personnel who, using traditional methods may otherwise become victims themselves.

Bosse arranged to have WISE

Technology demonstrate the versatility of the AIR Responder over the course of months in a variety of cold water conditions. Meanwhile, the rescuers who would eventually be using the vehicle were able to offer valuable input. WISE made improvements to the prototype, and the end result was delivered to the Poland (ME) Fire Department in July 2014.

"We are very excited to be the first in the world to have this valuable lifesaving vehicle. It can go across water, across ice, and anything in between in situations where you can't safely put another piece of equipment," adds Bosse.

The AIR Responder's specialized features result in reduced rescue time and increased safety for all involved. Its Kevlar®-reinforced foam-filled fiberglass hull, high-density plastic bottom and very low center of gravity render the AIR Responder virtually unsinkable. The vehicle is capable of reaching the victim



Image courtesy of WISE Technology

Amphibious Ice Rescue (AIR) Responder

Features

- Versatile for ice, broken ice, open water or snow
- Reinforced Kevlar® fiberglass hull
- Replaceable HDPE plastic bottom
- Foam-filled core makes hull essentially unsinkable.
- Large, flat nonskid platform to conduct rescues
- Low center of gravity provides for extremely stable work space.
- Very low freeboard (less than four inches) for ease of access and recovery
- Integrated edge rollers to assist in victim recovery
- Railing system designed as victim grab rail and responder tether anchor
- Deck-mounted electric winch for loading
- Snowmobile can be removed from the hull in five minutes and reattached in 15 minutes.
- Optional light rail for running lights or mounting spot or floodlights
- Light rail can be mounted in either forward or rear position.
- Rail can be laid flat in either position for passing under low obstacles.

Dimensions

- 15-foot overall length.
- Seven-foot beam.
- 33.4-square-foot platform.
- 650-pound dry weight without snowmobile.
- 1,450-pound functional weight when fully equipped.
- Approximately 900-pound weight capacity—two rescuers, two victims, and equipment.

Trailer

- Custom tilt-and-rotate design.
- Tandem axles for tire redundancy in case of flats.

- Designed for rear-facing deployment of vehicle.
- Tilt allows for quick deployment and recovery of the AIR Responder at rescue site.
- Rotation allows for quick reorientation of the AIR Responder for a rear-facing deployment.

Propulsion

- Arctic Cat XF 7000 long-track snowmobile with optional rail kit for second seat.
- Approximately 130-hp with full carbide studs.



in a fraction of the time of conventional methods, reducing the likelihood of hypothermia. Any necessary medical care can begin as soon as the victim is onboard while the vehicle returns to shore to the waiting ambulance.

History

After seeing media accounts of rescue personnel walking gingerly on, or often sprawled across, icy bodies of water to get to a victim, Roger Bailey of Gilford, New Hampshire, thought, "There has to be a better way." He founded WISE Technology, LLC (Water, Ice, Snow Equipment) in 2011 and, through years of study and prototypes, the AIR Responder was born. This device uses the power and speed of a snowmobile to propel it across a wide variety of ice, snow, and open water at speeds up to 25 miles per hour without fear of flipping or sinking because of its wide, buoyant design.

In November 2013, WISE Technology collaborated with The Landing School of Arundel, Maine, on constructing the hull. The post-secondary institution, founded in 1978, blends education in modern yacht design, boat building and marine systems technology into diploma and associate's degree programs. Together, composite boat building instructor Chis Audy and yacht design instructor Derek Wright built a prototype. Jamie Houtz, a fellow Landing School faculty member and experienced fire captain, weighed in on the design to ensure it would suit rescue workers' needs. They added a structural gird system, which provided added rigidity. They also reduced the weight of the hull by changing the laminate schedule and adding Kevlar® to the regions impacted by ice. The result was a more durable hull and increased optimum speeds.

WISE Technology received a patent for the vehicle in February 2014 and delivered

its first unit to the Poland (ME) Fire and Rescue that July.

In recent tests the AIR Responder was able to get to an accident victim in less time than it took firefighters to inflate and deploy their inflatable boat. A distance that took them 35 minutes round trip took the AIR Responder only six minutes. Because it is propelled by an unaltered snowmobile, speed and ease of steering make a significant difference.

"We are very pleased participate in this project with WISE Technology," says Robert DeColfmacker, Landing School President. "This opportunity allowed our faculty to help a local company fulfill its goal of developing a new-to-market product, one that will be used to save countless lives. It's a great lesson for our students about the positive outcome of collaboration".

 For further information, go to www.wisetechnco.com

Petroleum Storage Tank Facilities – Part 2

In the previous installment we talked about the types of petroleum storage tanks, their locations, and common fire hazards. In this article we will discuss the various types of fires and the fire protection methods available.



Craig H. Shelley
FIFireE, CFPS, Retired Chief

Craig is a 45-year veteran of the fire service. He served with the FDNY for 26 years retiring as the Chief of Marine Operations. Currently, Craig is an Assistant Chief with Industrial Emergency Services (IES) and Manager of Marine Operations. In addition, he is the CEO of World Safe International.



Sue Tarantino
BS, MBA, Retired Battalion Chief

Sue is a retired 27-year veteran of the Charlotte (NC) Fire Department. She is currently a Division Chief with Industrial Emergency Services (IES) and Assistant Manager of Marine Operations. She also serves as a senior fire protection specialist with World Safe International.

In the last article it was mentioned that different types of tanks have various common types of fires. Delving into these fires they can be further identified as follows:

Types of Fires

■ Overfill Ground Fires

Overfill ground, dike, or bund fires result from piping or tank leakage. This may be caused by operator error, equipment or instrumentation failure. These incidents are considered the least severe.¹ When a leak occurs without ignition, all ignition sources should be eliminated and vapors suppressed. Remember that our fire appliances (apparatus) can be the source of ignition. If ignition does occur, the fire is treated as a large pool fire. If valves or piping are leaking, treat these areas as three dimensional fires.

■ Vent Fires

Vent fires are typically associated with fixed roof tanks such as cone roof, covered floating roof tanks, dome roof, vertical low pressure fixed roof, and horizontal tanks. These are less severe fires and can usually be extinguished using a dry chemical extinguisher or reducing the pressure in the tank. Vent fires can be caused by lightning or sometimes hot work in the vicinity.

■ Rim Seal Fires

Rim seal fires comprise the large majority of fires in open top floating roof tanks. As with vent fires, lightning is usually the primary source of ignition. If the seals are not maintained, deterioration may cause fugitive vapor emissions to escape. When these vapors are in the flammable range they can ignite when exposed to an ignition source. There is usually a high rate of extinguishment success if there is no associated damage such as a pontoon

explosion or if the suppression efforts do not sink the roof by using excessive water during firefighting.

In internal floating roof tanks, rim seal fires may be extremely challenging, especially if there is no permanently attached foam system. With no foam system in place, the only openings to apply foam into the tank would be the small vent openings at the top of the tank. These openings typically have protective screens in them, hampering foam application further. With open top and internal floating roof tanks, fixed or semi-fixed foam systems are the preferred method of extinguishment for rim seal fires.

■ Unobstructed Full Surface Fires

With sufficient resources and trained personnel, unobstructed full surface fires are relatively easy to extinguish on relatively small tanks (less than 45.72 meters [150']). Larger tanks greater than this size will be much more challenging because of the size of the tanks, application and flow rates required, resources required, and the logistics involved with the firefighting efforts. Unobstructed full surface fires can occur in fixed roof tanks without internal roofs when the weak seam at the roof-shell joint separates from an explosion or other over-pressure event, leaving an exposed full liquid surface in the tank. External floating roof tanks can have unobstructed full surface fires when heavy loads (e.g., rains) exceed the weight capacity of the roof, causing it to sink below the surface of the product. This may also occur if the roof drains have been left closed during periods of heavy rains.

■ Obstructed Full Surface Fires

Full surface fires with a fully or partially sunken roof can occur where tanks have fixed roofs, internally floating roofs, or external floating roofs. These fires are



▲ Fire detection system in rim seal area. Interruption in electrical current by fire will activate foam system.

► Foam injection system for storage tank fire protection. This system must be started manually. Is your department familiar with the operation of this equipment? Especially at 2 a.m. when there may not be a facility operator on duty?

challenging because access to the burning surface is blocked by the roof or floating roof (pan). An increase in vapor pressure between the liquid and the roof can cause the pan to tilt, partially exposing product above the pan. Pontoon failure may also cause a pan to sink. Heavy rains may also tilt or sink a pan.

Fire Protection Systems

Fixed and semi-fixed fire protection systems are used in industry to protect various equipment and processes. They are used in many cases to protect petroleum storage tank facilities. In differentiating between a fixed and semi-fixed fire protection system we find that a fixed fire protection system has all of the components to produce water or foam discharges without the aid of a fire vehicle. Water and foam based systems may be activated manually or activated by the use of devices such as smoke, heat, or flame detectors. A semi-fixed system is required to be supported by a fire vehicle.

The following are some of the systems that may be found at petroleum storage tank facilities:

■ Rim Seal Protection

This is the most common type of system found on atmospheric storage tanks. They are installed on either an open top or covered floating roof tank. The rim seal will have a 30 cm (12 inch) to 61 cm (24 inch) foam dam designed to hold the foam in the rim seal area so that it can flow and extinguish fire along the seal. These systems can either be fixed or semi-fixed. Mostly, these systems

will be manually activated. The manual procedures could include starting the fire and foam pumps as well as opening and/or closing valves. A semi-fixed system will require a fire vehicle to connect to a lateral terminal connection and supply the foam chambers with foam solution at a specific pressure. These pressures should be identified during pre-incident planning and signs posted at the manifolds indicating these pressures.

Foam chambers are typically installed for rim seal protection, but in some instances they may be installed for extinguishment of full surface fires in both floating roof and covered storage tanks. Once again, pre-incident planning will be crucial to allow the fire service to know how much foam solution should be flowed and at what pressures.

■ Subsurface Injection

Subsurface injection may be found on some covered roof storage tanks. When a floating roof is present, this system is not practical and cannot be used. The floating roof will keep the foam from reaching the surface of the fuel. These systems can either be fixed or semi-fixed. Aqueous film forming foams have low fuel tolerance and will not effectively rise to the surface. Subsurface injection also can not be used with polar solvent products. Once again, during pre-incident planning consult the plant operators to ensure that your personnel know how these systems operate and ensure that foam supplies,

▼ Fire department connection for storage tank fire protection system. Note the pressures and flows for fire department operators.





◀ Cooling rings on storage tank.

▲ Point and Shoot system. Note the two lateral and one downward discharge ports.

both fire service and plant, are compatible with the fuel in the tanks. The foam solution must be injected above the water level in the tank. Foam injected below this level will dissolve into the water and not rise to the surface.

■ Cooling Systems

Another system that may be used is a cooling system. Cooling rings on the exterior of the tank are placed so that they discharge water onto the tank's exterior, protecting it from radiant heat from fire in close proximity. In many instances, these systems will have to be manually activated.

New Technologies

Looking back at storage tank fire protection we see that while fixed and semi-fixed systems have basically remained unchanged for 60 years but the size of the tanks has grown larger. In recent years, new technologies have been developed to make fixed and semi-fixed systems more efficient. As tank diameters increase, the degree of difficulty for extinguishment also increases. As with the rest of the fire service, new technologies help improve efficiencies and performance. Some of the new technologies for storage tank fire protection are:

■ Dual Agent Chambers

Traditional foam chambers would aerate the foam and distribute it evenly on rim seal or full surface fires. A dual agent chamber is a two-phase application through the same chamber. The first phase cascades a rich blanket of foam to extinguish and seal the surface of the

contained product, while the second phase injects Purple K dry chemical to evacuate the internal vapor space of any lingering flammable vapors, rendering the space inert. These systems would be used on covered tanks.

■ Point and Shoot System

The Point and Shoot system provides a more aggressive and more efficient foam application as compared to traditional foam chambers. In actual tests, the Point and Shoot system provides 73 meters (240 feet) of coverage from one wand, a 200% increase in performance over a foam chamber. The foam wand will distribute foam from three orifices, two lateral and one discharging down the wall of the tank immediately below the wand. An optional feature is the addition of a separate riser to allow a specialized monitor to be quickly deployed and mounted to the tanks rim for additional extinguishment and/or vapor suppression.

■ Hollow Point

The Hollow Point system was developed to overcome issues faced by foam chambers when they are installed on a fixed or cone roof tank for the purpose of full surface protection. When foam chambers are installed, they rely on gravitational forces and the static head pressure of the foam to provide the propulsion for the foam to cover the surface area of the product. The Hollow Point system projects the foam toward the center of the tank as well as to the left and right along the tank wall.

■ Ambush

The Ambush system is designed for use on large diameter jumbo storage tanks. Type II "Over the top" applications on these tanks require huge amounts of resources and firefighting equipment. In some locations, 122 meter (400+ feet) diameter tanks are present. The Ambush is designed to provide enhanced fixed system response for external floating roof storage tanks. The system reduces foam fallout from the stream to provide more efficient foam/water application densities. It addresses four distinct areas of the tank simultaneously; the area to the left of the wand, the area to the right of the wand, the center of the tank, and the area directly below the wand. Multiple units may be required for complete coverage depending on the tank diameter.

Additional information on these new technologies can be obtained direct from the manufacturer of this equipment. An internet search will assist with locating the manufacturer.

This article and our previous one have discussed the types of atmospheric petroleum storage tanks, the types of fires, and fire protection systems. Our next installment will discuss the strategy and tactics involved with fighting atmospheric petroleum storage tanks as well as pre-incident planning techniques.

For more information, go to www.worldsafeinternational.com

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Maintaining Officer Safety in a Tight Spot

Just one year before the Confined Spaces Regulations 1997 and Approved Code of Practice (ACoP) came into force, the HSE prosecuted Tayside Fire Board for the death of a firefighter who was killed trying to rescue two men trapped inside a silo containing soda ash.



Ken Smith

Since 1997, the relevance of these regulations across both the emergency response sector and for fire and rescue officers in particular has remained unchanged. However, a recent review of ACoP L101 'safe work in confined spaces' by the HSE revealed a need across all industries for further clarification of the risks and individual requirements when entering a confined space. Following consultation with fire service personnel and other workers heavily involved in confined space work, a revised ACoP was published at the end of last year. This firmly places a wide range of potential fire and rescue call-out scenarios at the centre of the Confined Spaces Regulations.

Identification is key

A 'confined space' is defined as a place that is substantially enclosed, although not always entirely and where there is risk of serious injury from hazardous substances or conditions within the space or nearby. This can include any chamber, tank, vat, silo, pit, trench, pipe, sewer, flue, well or other similar space in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk. Specified risks are:

- Serious injury arising from a fire, explosion or excess of oxygen
- Loss of consciousness arising from an increase in body temperature



Ken Smith is a Consultant at Arco Training and Consultancy.



- Loss of consciousness or asphyxiation arising from gas, fume, vapour or the lack of oxygen
- Drowning arising from an increase in the level of liquid
- Asphyxiation arising from a free flowing solid or the inability to reach a respirable environment due to entrapment by a free flowing solid e.g. underground rescue

Under this definition, a confined space must be both substantially enclosed and also present a reasonably foreseeable risk of one or more of these specified risks. Although it may appear easy to identify simple confined space scenarios on this basis, such as entering sewers and closed tanks used to store chemicals, it is not always so simple. The traditional understanding of a 'confined' space is not necessarily accurate or all-encompassing in reference to the regulations. For example, confined spaces aren't necessarily enclosed on all sides and do not have to be small, difficult to work in, or difficult to enter and exit. As a result not all enclosed

environments are subject to the Confined Spaces Regulations.

An enclosed area without a specified risk is not classified as a confined space, even when there are other hazards present, such as restricted movement when working in lofts or cellars. In this case, fire and rescue officers must still consider how people will be safely evacuated if they suffer an injury. Any risk assessment should instead draw from the relevant regulations such as Electricity at Work Regulations 1989, for example.

Another misconception of confined spaces is that they are uncommon places of work that are entered on an intermittent basis. However everyday workplaces, including car repair centres where spray painting takes place and large warehouses where gas cylinders are stored, also constitute a confined space. Therefore it must be taken into account that an area that may appear to be free of contaminants, with a safe level of oxygen, can become a confined space if there is a change in conditions or in the degree of enclosure.

Task-based definition

The most significant shift in emphasis as part of the HSE's recently revised ACoP for confined spaces is the identification of a confined space as part of an increasingly task based definition. Rather than looking at a specific area as a confined space, fire and rescue officers are reminded that each task must be reviewed in relation to the Confined Spaces Regulations. This challenges a previously accepted view that environments with relevant control measures in place, such as officers wearing the correct protection equipment, could be de-classified as a confined space. The revised ACoP makes it clear that these environments must retain a confined space definition and be risk assessed accordingly.

Another recent clarification within the 2014 ACoP states that all storage locations are to be classified as a potential confined space. On a practical level, this encompasses a huge variety of potential call-out scenarios for fire and rescue officers in locations as varied as pubs, where gaseous pumps and barrels are

CONFINED SPACE TRAINING

stored, to recycling centres where storage piles often absorb excess oxygen and the metabolic breakdown of organic matter generates heat. As a result, many fire and rescue officers that had previously deemed their likelihood of attending a confined space incident to be rare now find themselves at the centre of numerous instances.

Realistic training

The first step in identifying the potential risk of entering a confined space is to conduct a risk assessment. This will ensure a safe system of work for all individuals by enabling the provision of suitable equipment and training for every

individual. All fire and rescue officers, whether directly entering the space, providing support or preparing safe systems of work, should be experienced and competent both in confined space entry and the potential scenarios and hazards that they may be faced with. This could include firefighting in building or compartment fires, investigating smoke, odours or vapours in cellars and rescue from sewers, tanks, silos, wells or trenches. It is essential that all individuals undergo a thorough practical training programme to ensure that they are prepared to respond to these scenarios and are familiar with the expected safety standards and processes.



Confined space scenario training should cover the recognition and identification of possible hazards, evaluation and control procedures, and the setup, use, and restrictions of any equipment used in the confined space rescue process. Familiarisation of the use of emergency equipment, ventilation equipment, hazardous energy control, isolation and lockout equipment and air quality monitors such as oxygen or combustible meters is also key, in addition to practising the setup, use, and restrictions of all personal protective equipment (PPE) such as respirators and full body harnesses. Each element of training must be designed to ensure that work is undertaken in a manner that will not endanger fellow officers' lives or those of the public.

Offering an alternative to off-site training centres, Arco has a fleet of state-of-the-art mobile confined space training units available to offer realistic and practical training for fire and rescue officers without the usual costs involved of having to loose fire cover at the station. These mobile units offer the added benefit of being able to reach brigades based in any location across the UK, providing a flexible training solution. Arco's team of experts provides

hands-on guidance and support, developing and delivering a bespoke training programme tailored to the specific requirements of each brigade. This allows individuals to learn in a way that suits them, exposing them to some of the potential hazards of working in confined spaces in a fully monitored and safe training environment.

Realistic simulation of confined space scenarios is created with the use of the mobile unit's extensive tunnel configurations in addition to the ability to introduce lights, sounds, smoke and water. A camera system also allows the trainer to guide each individual and provide real-time feedback, as well as recording video footage for later review and assessment.

Assuring safety

Recent changes to the Confined Spaces ACoP by the HSE is an effort to clarify confined space working requirements and to make individuals more aware of the risks involved, places officers at the centre of numerous confined space incidents that were previously believed to be declassified by control measures. This makes it more important than ever to ensure that each brigade is safeguarded against the potential hazards that they may face in the field by delivering practical training.

It is clear that a one-size-fits-all approach to training is impossible as every service is operating in a unique environment and each fire and rescue officer has a different way of learning. This makes Arco's tailored mobile training offer ideal for providing quality, accredited and assured training delivered in a realistic and safe environment.

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21st Century Decontamination Where Are We Going?

There are few things more uncomfortable and more dangerous than working in a HazMat suit in a HazMat Danger area. There are also few things more exhausting. To the public HazMat Operatives seem rather like tame Martians oddly human shaped but a different colour, moving like automatons, stopping for a rest frequently and avoided by all the normal looking people.



Tim Otter

If there are two more difficult and dangerous places apart from an Ebola ward they involve CBRN (chemical biological radiological and nuclear) threats and the world of explosive ordnance disposal (EOD) and counter improvised explosive devices (CIED); both frequently called “bomb disposal”.

CBRN and EOD are probably more dangerous because somebody is deliberately trying to kill you. Both are more uncomfortable, one because it is long term and the other because EOD bomb suits are even heavier, hotter and less comfortable than a HazMat suit. EOD is infinitely more lonely because the operator is cold bloodily working on his own. Bomb disposal was the first military/counter terrorist branch to embrace the use of unmanned vehicles or robots. This development was spurred on by the horrendous casualties among EOD operators in the early days of the bombing campaigns in Northern Ireland.

Many of these casualties were caused by pure bad timing, arriving too late to render the device safe but nevertheless making an attempt to do so. Many others were quite deliberate attempts to booby trap the security forces with secondary devices and anti-handling devices and with yet a third class of device designed specifically to kill the bomb disposal officer with compound and complex devices.

The ability of the British armed forces and their scientific back-up to try to out-think, out-smart and outperform the bombers earned the bomb disposal operators the nickname of Felix, the famed cat with nine lives. A key part of this success was a series of bomb

disposal robots developed initially by Graseby Dynamics and then latter by Alvis and latter still by Northrop Grumman. There have been several imitators and many clones but all operated on the basic principle of not putting the man in the suit at risk by deploying his tools to the site of the device and either disrupting or defusing it remotely.

Fast forward a decade or so to the road side bombs of Iraq and Afghanistan and the same issues prevailed. An extremely cheap but effective weapon system or systems was causing high levels of casualties. A key part of the activities to “defeat the device”, one of the phases and phrases of the CIED policy, inevitably involved extraordinary bravery and great coolness by individual bomb disposal operators to defuse multiple complex devices and recover forensic evidence to allow actions to “defeat the network”. However an increasing reliance was being placed on unmanned robotic devices or unmanned ground vehicles (UGVs). A UGVs’ part in the battle was to reduce the effectiveness of IEDs, clear them from key routes and the routes the troops wished to use and make areas safe for civilians to move and live in.

The robots were used to carry tools to the explosive device to disable it, smash the device out of the ground or physically disrupt it so it failed to function. These robots slowly moved from small electric vehicles, usually battery powered, to diesel driven with huge weight carrying capacity, a large range of disruption tools and great endurance and power provision allowing them to move with the troops without having to rely on a vehicle

Tim Otter is Chief Executive of Lutra Associates.



to transport them. They also allowed the troops to concentrate on their job without having to worry about the IED threat because the device took care of it. The state of the art was thus defined. The DOK-ING MV 4 known in the US as the M160 probably set the standard.

A key difference between CBRN and HazMat is that a CBRN target is by definition just that a target as opposed to something that happens to get in the way. This pre-supposes that someone has deliberately attacked it or it must be assumed that it will be attacked. It must therefore be able to resist attack by chemicals of all types, with some more likely than others to be encountered, radiological materials and biological matter. This resistance can come from design for resistance to contamination or for ease of decontamination and build standards including the incorporation of special paints or sacrificial coatings that peel off when contaminated. Whatever the method or combination of methods used the process is designed to remove or minimise deliberate contamination.

In a HazMat situation contamination

is distributed randomly in a contaminated area that is not expected to be contaminated. The contamination is not, except in very rare circumstances, the result of a deliberate act. The distribution of contaminant in the contaminated area is a result of serendipity not deliberate action. Who would have thought that a postal sorting office and a newspaper office would be contaminated by hazardous material as they were in the USA? Deliberately preparing everything as the military should do for contamination is unlikely to be possible or affordable. Attempts to decontaminate this sort of target need to take into account a variety of surfaces, substances, materials and concentrations. It is a horrendous task.

Dealing with the task of decontamination is likely to be time consuming, messy and require a lot of people unless it is effectively targeted. The more effective the directing of the decontamination methodology onto the contaminant, the more efficient the decontamination and the less manpower used and, if the decontamination is water

based, the less water used. In many areas water supply is a vital consideration. This targeting is achieved by effective survey and monitoring of the target area. In other words there is a need to use instruments to find where the contamination actually is and then when decontamination is administered confirm the effectiveness of the decontamination.

Developing this issue of survey/monitoring, there is a distinction to be drawn between chemical and radiological substances and hazards and biological material and hazards. In essence the speed of reaction required is the difference between a "lights, bells and sirens" affair for chemical and radiological and a public health event for biological. This is fortunate because radiological and chemical detectors and monitors are capable of rapid agent detection and identification whereas biological sampling and analysis systems can, and often do, take several hours to provide results. The concept is thus to identify the chemical and radiological materials and decontaminate as quickly as possible. People who might be contaminated

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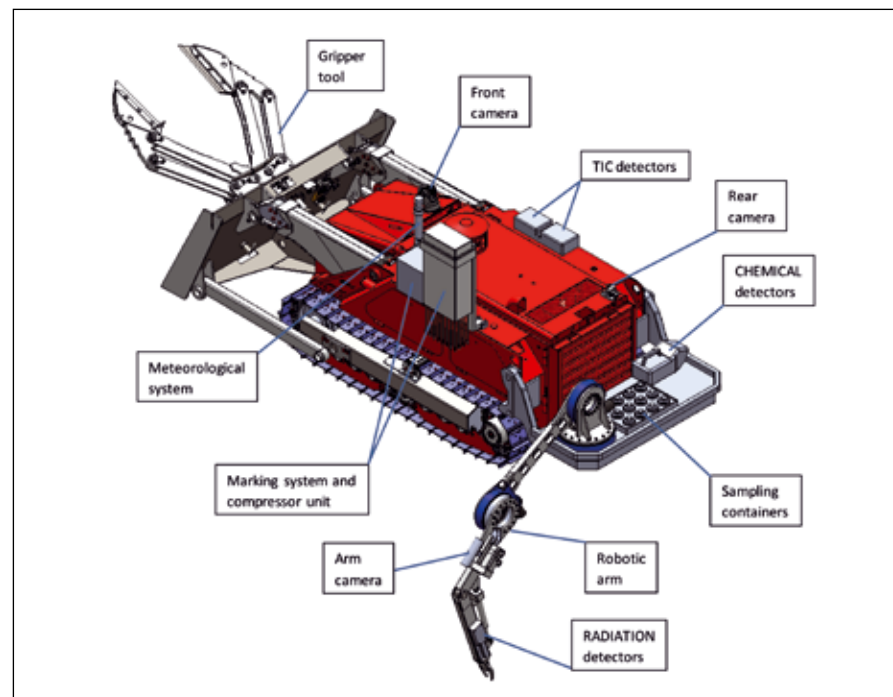
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by biological material, for instance the ubiquitous white powder, can be isolated, tested, then decontaminated and treated.

What this means is that within the hot zone there needs to be an effective collection system so that the sample can be collected, tagged for evidence purposes, and, in the case of a biological detector, stored, transported to the detector, for they are large and not robust enough to move into the hot zone, and then analysed. Systems incorporating mimic hands are now coming available that allow this previously very difficult activity to occur. Shadow Dexterous Hand is an example of this.

For all forms of CBRN/HazMat decontamination a water/foam mixture, in whatever concentration/mixture is usually the preferred option. Different concentrations are available for different classes of decontamination. The usual classifications of decontamination targets are people for which RSDL is probably the most popular, sensitive equipment and important equipment and property (again using RSDL or SX-34 sensitive equipment decontaminant from

Cristanini SpA) followed by bulk/inert equipment or property.

There are some aspects of HazMat that are not usually required in CBRN probably the main three are; the ability to hear what is going on around the site, the need to cool various elements of the HazMat site and the ability to lift and carry and or rip and pull things apart.

There are now good sound systems that will allow the noises and sounds, for example those of boiling pressurised gasses or venting explosive vapours, on site to be transmitted over distance so the need for human ears on site is dispensed with, a further distancing of the operator from the danger. Mechanical systems are much better at lifting and ripping and tearing objects on site. They do not get tired and they do not risk tearing the operator's HazMat suit. Water and foam can be mixed and delivered on site. Equally as important as "ears" are "eyes". Good cameras are essential.

All this information and data from sensors is all well and good but what do you do with it. Prediction systems are now available to calculate the contaminated

area and predict downwind plumes. To do this they need accurate meteorology data. Marking the contaminated area is important to prevent cross contamination. Again borrowing from the military both these systems are available.

This is a considerable new capability that is being put together. A capability is only as good as the training the users receive. The training the users receive is only as good as the realism and fidelity of that training. Establishments like the Swedish Rescue Training Centre/SCP in Skovde Sweden are the ideal place to train and test operators and commanders alike in the new skills and capabilities and the decisions that surround them and make them an effective team. Once that initial training is complete and people understand the tactics, procedures and capabilities required and available it needs embedding in procedures and constant practice. To borrow a phrase made popular by an animal charity in the UK "HazMat is for life not just for Christmas!" As our world gets ever more complex and chemical there will always be a need for evolving HazMat.

It can be seen that a capability is emerging that takes the best of capability from the EOD/CIED and CBRN arenas and couples it with unique HazMat requirements and turns it into a capability able to do what unmanned vehicles do very well i.e. dull dirty and dangerous tasks. HazMat is never dull but it is certainly dirty and dangerous. This can be done without putting the operators at risk and can be used to get into incident scenes which currently would be inaccessible.

These requirements are something that can be put together on a single platform which allows all of these capabilities to be deployed within a contaminated area, be it a HazMat or CBRN, many of these are common and can be combined. Thus sensing, sample collection, sights and sounds, decontamination, ripping and tearing, meteorology, prediction and marking can all but packaged onto a UGV and deployed to report a work from within the hot zone and deal with the HazMat problem remotely and this surely has to be the way to go, wherever possible removing the man from the danger area.

For further information, go to www.lutra-associates.com

For all forms of CBRN/HazMat decontamination a water/foam mixture, in whatever concentration/mixture is usually the preferred option. Different concentrations are available for different classes of decontamination.



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Innovative approaches to PPE design

Whilst innovation is fundamental to driving progress through the adoption of new materials and product design, this can also be accompanied by increased costs as new, better performing materials are often intrinsically more costly to produce whilst improved manufacturing techniques require additional investment.



Roger Startin

Over the past 10 years, PPE for the emergency services and, in particular, the fire and rescue services has developed by providing more specialised clothing designed to protect wearers from exposure to the specific hazards and dangers associated with their differing operational conditions. During this time we have seen fire services re-identify themselves as fire and rescue services to reflect their wider remit.

Whilst firefighters have always been engaged in rescue work directly linked to structural fires, their increasing involvement in the broader range of urban search and rescue (USAR) activities involving buildings, vehicles and major incidents and disaster recovery has meant that their operational activity increasingly involves rescue work. The natural extension of this wider responsibility, and its varying nature, for those engaged in supplying specialist protective garments has been to design new clothing to meet the specific needs of the wearers. In the case of technical rescue work, the garments need to provide greater physical protection than structural kit whilst normally requiring less heat, flame and protection against water penetration. This led, in 2005, to the development of prototype garments designed specifically for technical rescue applications which have since been widely adopted throughout the UK's FRS. Similarly, wildland firefighting requires the focus to be on protection against intense heat and flame lick which has led to the design of very light weight flame retardant coveralls.

The advantages for fire and rescue services has been the scope to better equip their firefighters for any eventuality. The downside is inevitably the need for larger PPE budgets and more

complicated wardrobe management as two, or three, different sets of kit are provisioned and stored, to be deployed as required. Bigger budgets also need to cover the added costs of procuring, maintaining and managing larger stocks of garments along with the logistics of handling and monitoring PPE allocation and service records.

Use fewer garments

Internationally, the growing pressure on public sector budgets, which has increased considerably in the years since the financial crisis of 2008, means that fire authorities are looking for ways to reduce their spend on the provision of emergency services which inevitably



impacts on firefighter PPE. To be able to respond to these procurement pressures, manufacturers have been working on innovative solutions that maintain the levels of firefighter personal protection, whatever their operational needs, whilst reducing the overall level of costs associated with procurement, stock, maintenance and technical support. In response, Bristol has developed an innovative layered approach which uses fewer garments in different combinations to provide firefighters with the accepted high levels of protection, as measured by European and International Standards, whether deployed in structural or wildland operational environments or in technical rescue activities. The XFlex™ Layered Garment has been introduced as an economical solution to PPE provision and a means of reversing the trend of recent years which has witnessed the proliferation of garments acquired by fire services to meet all the required standards across the various operational scenarios.

Use the most durable materials

Through the continuous process of evaluating new materials and the development of advanced manufacturing methods, the benefits of lighter weight fabrics combined with innovative garment design has led to new products being brought to market which not only provide enhanced wearer protection, with less physiological impact, but provide extended wear and service life. Bristol has an established track record as an early adopter of new materials, including fibres from PBI Performance Products and DuPont Nomex®/Kevlar used in the manufacture of the latest range of Hainsworth TITAN outerlayer fabrics, and marrying these to the most advanced GORE-TEX® breathable moisture barriers to achieve world class PPE solutions. To protect garment stitching, where surface abrasion is often a cause for repair, Bristol has introduced Trimsaver which encapsulates thread into a meta Aramid braid. This can reduce the likelihood of thread repair by over 85%. The use of breathable reflective tape, when added to garments by a carefully controlled micro-perforation process, maintains the level of breathability, and therefore the comfort, of the entire garment. These are small, but significant, contributions to the overall performance and durability of firefighter



PPE and contribute to the overall reductions in ownership costs constantly being sought by fire authorities reluctant to economise on wearer safety.

Make garments last longer

Cost benefits can be achieved through rationalising garment stocks, whilst further savings can be, and are being, made through adopting maintenance programmes designed to extend the service life of firefighter PPE and reduce long term replacement costs. Innovation comes in many guises, and the availability of a wider range of options allows fire authorities more choice through adopting procurement and management programmes which best suit their needs and financial circumstances. The cost-effectiveness of regular garment maintenance has been proven over the last 15 years, with the maintenance and repair facilities available being steadily expanded to extend further the operational life of all types of PPE. A growing number of Bristol's PPE distributors are offering these facilities either in-house, or through external contracts with specialist repair and maintenance providers who are trained to adopt processes accredited by Bristol through their distributors. The introduction of these facilities allow garments, which

might previously have been condemned, to be returned to firefighters for continued normal operational use.

Work creatively

PPE innovation is a combination of creativity in design and manufacture coupled with new approaches to the whole process of equipping firefighters with the best protective garments available in the most efficient way. The last few years have seen the pace of PPE product development, as well as its maintenance and management, expand considerably to meet the challenges of more demanding economic conditions in many parts of the world.

One of the biggest challenges has been how to maintain, or even improve, firefighter protection and safety whilst at the same time delivering front line operational protective clothing that creates better value and a long term lower cost of ownership. The adoption of more creative thinking by both users and their suppliers, combined with improved collaborative working, should help to maintain the highest safety standards we have come to expect for our firefighters whilst, at the same time, satisfying the need to operate in much tougher economic conditions.

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Roger Startin is Joint Managing Director, Bristol Uniforms.



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A Sensible and Proportionate approach to Health and Safety

The year 2014 was memorable for many reasons but for a health and safety professional working in the UK a definite highlight was the 40th anniversary of the Health and Safety at Work etc Act. This ground breaking piece of legislation ushered in a very different way of looking at occupational health and safety and many of us would regard it as an unqualified success.



Bill Hazleton

Bill Hazleton is the Head of the Defence and Public Protection Unit for the Public Services Sector at the HSE.

In this article, though, I want to look at how and why complying with health and safety law has been seen as a problem for our emergency services and what HSE, working with stakeholders, has done to address concerns.

First, though, let's set the scene by looking at the Act and reminding ourselves about some of its special features.

The 1974 Act was ground breaking because it moved occupational health and safety away from the prescriptive and towards a more goal setting approach. Look at pre 1974 legislation and you will be struck by how it sought to control every aspect of health and safety in the workplace. The Factories Act 1961 alone consisted of 185 sections in 14 parts with an additional seven schedules. Everything from guarding of machinery to special precautions in match making factories was covered by this single act. Numerous other acts and regulations added to a bewildering array of rules that harked back in many ways to Victorian times.

Although the 1974 Act didn't entirely sweep away the old style legislation (it would be many years before the Factories Act was finally repealed), it did begin a process of harmonisation and simplification. The Act set out a number of general duties to be achieved by employers and employees and in doing so compressed a number of the old style regulations into something a lot simpler such as the goal of ensuring the health, safety and welfare of employees.

The new Act was also grounded in reality. It recognised that risk could never be totally eliminated and duties

were qualified with the term "so far as is reasonably practicable". This allowed employers to concentrate on real, significant risks and find ways of dealing with these in a practical way.

The move to "modernise" health and safety legislation also meant extending its application to include whole classes of employees previously not covered including, of course, employees of Fire and Rescue Services (FRS).

Over the following thirty years or so, the Act and legislation made under it, proved to be a big success as British work places came to be amongst the safest in the world. HSE nationally established a formidable capability as a responsible and responsive regulator and internationally, a reputation as a leader in research and development.

So, whilst there were no grounds for complacency, the future did at least look promising. Why then did our emergency services not share in the optimism?

I think there are two things to consider in answering that question. The first is to do with how, over the last ten years or so, the health and safety brand has become tainted by those who see it as somehow having contributed to a general decline in society. The stiff upper lip of yesterday has been replaced by the compensation culture, the nanny state, the desire to wrap our children in cotton wool so that nothing nasty could possibly happen to them.

Many thousands of words have been written about "slaying the health and safety monster" to return us to a golden time when men were men etc. It's not the purpose of this article to add to that particular argument but suffice

to say that a climate was created in which many began to regard health and safety as part of the problem rather than part of the solution. Certain politicians, supported by allies in the media, fanned the flames of indignation and scarcely a week went by without claims of how health and safety had banned this and that: a memorable example being the use of the traditional fire fighters pole in fire stations. The lack of a factual basis was not allowed to get in the way of the message! (Incidentally, those interested in how HSE has fought back should go to our website and check out our "Myth busters" pages).

The second reason was far more "real world".

By 2008, a number of high profile events involving the emergency services had given rise to a perceived conflict between complying with health and safety law and operational duties.

Two unsuccessful prosecutions by HSE of the Metropolitan Police and the high profile use, by the Crown Prosecution Service, of health and safety law in a prosecution following the fatal shooting of Jean Charles De Menezes at Stockwell tube station prompted some senior police officers to say that health and safety law should no longer be applied to police activities.

There were similar feelings of disquiet among some senior officers in FRS following events such as the joint police and HSE investigation into the deaths of four fire fighters at a factory in Warwickshire and the adverse media response to the perceived failure by an Incident Commander to order the rescue of a motorist from shallow water following a road traffic accident.

Clearly, something had to be done to address these concerns whilst also ensuring that fire fighters and other emergency service workers properly remained protected by health and safety law.

HSE responded by inviting leaders of FRS and Police Services to a meeting to collectively discuss possible ways forward. It's to the credit of all involved that a number of important points were agreed:

- All participants wanted to work together to provide clarity on the application of health and safety law



- HSE should clarify what it expected of the emergency services particularly with regard to their management of fast moving, high risk situations
- This clarity would help emergency services comply with their legal duties and aid consistency in decision making by HSE, particularly when it came to taking enforcement action. It would also help individual officers and the public understand the limitations of what the emergency services should and should not do.

HSE made a number of proposals that leaders of the emergency services accepted:

- HSE should organise a workshop to jointly explore the balancing of safety and operational duties
- The results of the workshop should be set out in a published "high level" statement

- Employee representatives should contribute fully to this consultative process
- Further guidance should be developed to give substance to the decisions made and agreements reached.

There then followed a series of productive meetings, workshops and consultations and to cut a long story short, the result was the publication of new guidance entitled "Striking the balance between operational and health and safety duties in the Fire and Rescue Service"

A similarly entitled document was published for the Police Service and both can be viewed on the HSE web site.

If you look at "Striking the balance" you will see that in many ways it distils, confirms and puts down in black and white what I said earlier about the realism and flexibility built into the 1974 Act.

The document establishes a set of principles that acknowledge how the application of health and safety law is challenging for FRS in relation to their operational activities because (and here it is worth quoting directly from the document):

- They have to send firefighters into dangerous situations in order to save lives when anyone else would be seeking to get away from the danger
- There is often an unrealistic public expectation that firefighters will put themselves at risk even when such risks outweigh any potential benefits to be gained
- Many incidents firefighters face can develop at speed, some can develop in unexpected ways – and firefighters may, from time to time, be confronted with situations outside their experience
- They have to prepare individual employees to be able to make decisions in dangerous, fast

- moving, emotionally charged and pressurised situations even when there may sometimes be incomplete or inaccurate information about the incident
- They have to respond to dangerous situations which are not of their own making – this is different to most other sectors where it is the employer's own business that creates the hazards and
- They may not be able to control or mitigate some aspects of the working environment

The document reassures the reader on that important point that duties under the 1974 Act are qualified by the test of what is reasonably practicable. The Act does not require all risks to be eliminated and HSE recognises that even when all reasonably practicable precautions have been taken, harm could still occur. "Striking the balance" also commits HSE to promoting health and safety management in FRS through a range of activities such as:

- Communicating and listening to interested parties
- Working with those interested parties through joint initiatives
- Inspecting, investigating and enforcing in a consistent, appropriate, fair and balanced manner.

The FRS Striking the balance statement was launched on 12 March 2010 and was well received. The Government's Chief Fire and Rescue Advisor at the time said "I welcome this statement which seeks to clarify the HSE expectations on fire and rescue services with regard to health and safety management and aims to provide a consistent approach to applying health and safety enforcement and safety audits within the fire and rescue services work".

A national officer of the Fire Brigades Union added that "The FBU is glad to see that HSE recognises there is a balance between placing unacceptable expectations on firefighters and making sure they are trained and equipped to safely carry out the job they are expected to do – save lives".

The Government also supported the approach taken in "Striking the balance" but asked that further guidance be issued to reassure firefighters (and police officers) that they will not be investigated or prosecuted for undertaking an act of genuine heroism.

I am certain that HSE would never have considered prosecuting individual heroic firefighters but to avoid doubt, we published an additional document called "Heroism in the fire and rescue services". This provided the reassurance asked for as well as a number of realistic case studies of heroic actions by firefighters. You can read this document on our web site alongside "Striking the balance".

Health and safety law and the way we enforce it have come a long way in forty years. Firefighting remains a difficult and at times dangerous job but those who do it should be in no doubt that HSE does not exist to add to their burden. Ours is a collaborative approach and long may we all continue to make every attempt to work together to help brave men and women stay healthy and safe.

➔ For further information, go to www.hse.gov.uk



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suppression. This can also include extinguisher selection and use.

- Breathing apparatus (BA) training to enable students to select, maintain and wear BA in irrespirable atmospheres.
- Training can be delivered on ventilation strategies and the impact it will have on firefighting operations, as well as thermal imaging camera training and cable entanglement.
- The school also specialises in training delegates to conduct search and rescue operations in restricted visibility scenarios.

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Flammable Metal Fires

In comparison to other fire types, the occurrence of flammable metal fires would be significantly lower than Class A and B fires. Statistics would show that of all structural fires attended by fire fighters, most will be controlled within an accepted time period due to the repetitive, rigorous training routines and modern equipment that allow for a fast response.



John Whitehurst

When a fire fighting crew arrive on the scene of an Industrial scale flammable metal fire, they do not carry any equipment or extinguishing agents specifically designed to ensure the safe control of a flammable metal fire. The resultant success rates in terms of controlling the fire and limiting the damage to property is minimal. It is not always possible for the fire service to have advance knowledge of the type of fire they are about to face and indeed these metal fires are often characterised by the increase in their intensity when conventional foam and water extinguishing agents are applied.

The need to introduce more lightweight components into automobiles and aviation make magnesium a desirable material to

use and processing plants, die casters, machining plants and manufacturing plants are becoming busier due to these modern day requirements. The result is the increased use of metals such as magnesium in every day industrial applications and the frequency and scale of these fires is likely to increase significantly.

In the event of an industrial scale fire the application of a small number of 9kg fire extinguishers which could be carried on the vehicle, will not realistically prevent the fire from spreading. An incident in Staffordshire in 2014 saw a flammable metal fire at a local metal waste recycling plant where there was a large store of Magnesium swarf. This incident required the resources of numerous fire engines



John Whitehurst is Export Sales Manager at Dupré Minerals.



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Introduction

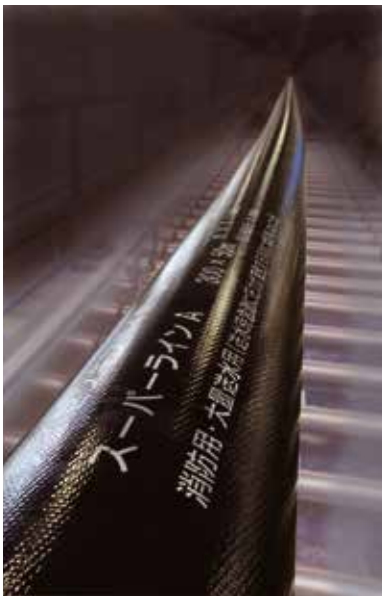
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	inch	4.0	6.0	8.0	10.0	12.0
Color		orange	orange	orange	black	black
Wall thickness	mm	3.5	3.5	4.0	4.6	5.0
Weight	kg/m	1.1	1.6	2.8	4.0	4.8
Burst pressure	MPa	4.2	4.4	3.6	3.0	2.8
Maximum working pressure	MPa	1.6	1.6	1.4	1.4	1.4
Temperature range	°C	-20°C~50°C				



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CLASS D FIRES

and more than 40 fire fighters were present. They were largely ineffectual due to the fact that they could only contain the fire to a single building whilst it burned itself out.

The only control measure which was available to the fire service was to spray foam into the building to assist in the cooling of the magnesium waste as it burned. In doing this, they were adding water to the fire, which in this category of fire only serves to offer further energy and to increase the intensity of the fire.

So new thinking and a new approach is required to ensure that fire fighters in attendance at flammable metal fires have the right materials available to tackle this type of fire. Fortunately there is now a new product designed specifically to combat this fire type. The product is Aqueous Vermiculite Dispersion, which has been extensively tested on magnesium powder, magnesium chips and magnesium swarf alloys (AZ 91 and AM60) during its developmental phases with successful results.

So what is Aqueous Vermiculite Dispersion (AVD)?

Unlike traditional flammable metal fire extinguishing agents, AVD is a water based agent whose success lies in the platelet shaped vermiculite particles (aluminium-iron-magnesium-silicates) that are contained within the self suspending dispersion. This is achieved through a carefully monitored and controlled manufacturing process at Dupré Minerals' manufacturing plant in Newcastle-under-Lyme. AVD is a product that compliments the more traditional thermally expanded vermiculite products that are also produced on site. The chemical process removes the inter-laminar trapped water and yields microscopic, individual platelets that are freely suspended in water.

AVD is fine tuned from this vermiculite suspension to allow it to be deployed from traditional liquid fire extinguishing equipment and is typically 20% vermiculite concentration/80% water concentration.

How does AVD work?

A water based extinguishing agent, would not normally be recommended for any Class D fires due to the reaction between the flammable metal and the water. However, AVD is unique in this regard if applied as a fine mist or a foam.

As a mist

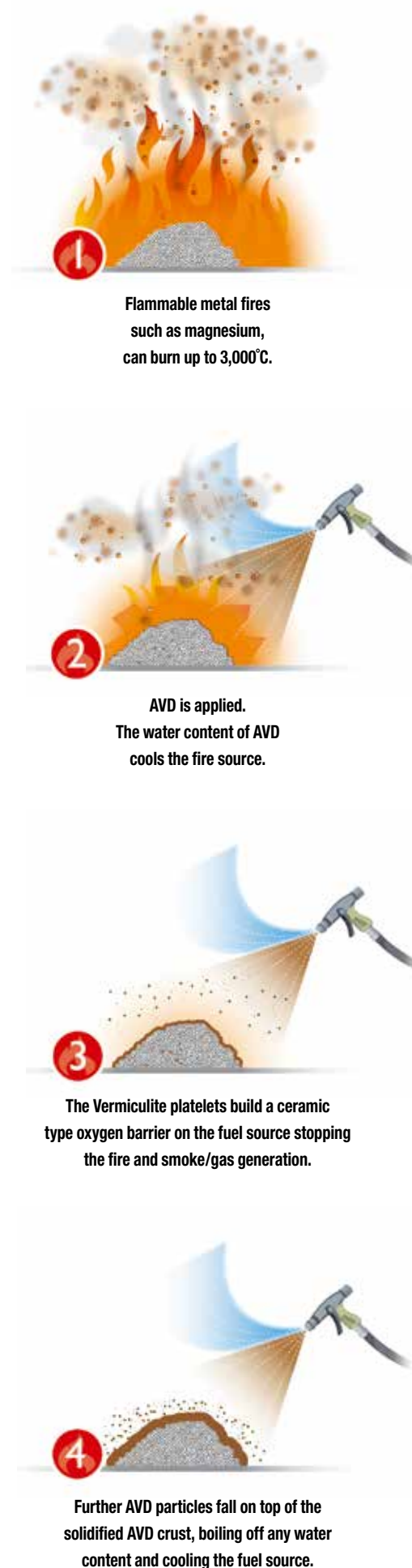
When it is applied as a mist with a droplet size ranging between 100 microns and 200 microns, the water content of the fine droplet evaporates due to the high heat of the fire, which can be burning at up to 3000°C. This means that instead of depositing a wet mist onto the fire, it is actually a dry mist that initially comes into contact with the burning metal. This initial layer of vermiculite platelets, being dry in nature, do not react with the fire, instead form a layer over the top of the fire and in a short period of time will form an oxygen barrier between the fuel and the oxygen present in the atmosphere. There are no bonding agents, adhesion promoters or other organic additives in AVD. The vermiculite platelets in AVD naturally overlap and bond together whilst drying to form a tight oxygen seal. Subsequent layering of the AVD on the fire will tighten the oxygen barrier and in doing so starve the fire completely of oxygen and will extinguish the fire completely.


As a foam

AVD foam works on much the same principal as AVD mist. To be successful as a foam, it needs to almost be a dry foam, thus ensuring that as AVD is applied, the thin wall structure of the foam bubbles dries instantly on the fuel source creating almost an instant barrier between the fuel and subsequent layers of foam. Foam application ensures that you can apply a thicker, less dense AVD barrier quicker than an AVD mist barrier whilst still offering the same oxygen barrier properties that ensure the fire is actually extinguished underneath. The AVD barrier is ultimately wetter, simply due to the quantity of AVD being applied in comparison to a mist deployment. However this just serves to offer better cooling properties to the fire underneath.

Application equipment

There are no real limitations in terms of how you can deploy AVD. It is not restricted as Class D powders currently are and as a liquid extinguishing agent, it benefits from utilising all the standard extinguisher bottles, backpack systems, mobile trolley systems as well as installed fixed systems that can deploy liquids. Importantly, where dry powders need to be deployed in very close proximity to the fire, AVD can be deployed from a





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What is AVD?

AVD is an extinguishing agent designed for flammable metal fires such as magnesium and lithium battery fires.


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distance of up to 10 metres with portable equipment, thereby reducing safety concerns. Additionally, AVD has been proven to be able to utilise standard fire fighting equipment that is carried on the fire engine such as the LPP's, standard hoses and branches that are carried around as standard. By combining these standard Fire Fighting pieces of equipment with a 1000 litre IBC of AVD you have a system that is capable of tackling an industrial fire from a distance of 15 metres. Taking the unfortunate incident in Staffordshire last year, if this extinguishing agent were available on the day, then the fire would certainly have been controlled much quicker, reducing business disruption.

Current Class D Powders

Current Class D powders such as those based on graphite and sodium chloride offer good control to small scale Class D fires, such as a small swarf pile or spillage of powder but can they be used in large scale industrial fires? The answer is probably yes, however the proportion of Class D powder that you would need to store versus the size of the potential fire would be enormous, making it an almost impossible consideration.

Controlled tests have also shown that graphite and sodium chloride powders offer good smothering properties to the fire, but do not fully extinguish the fire and instead simply cover the fire whilst it burns itself out.

Problems with Accreditation and Certification

Classifying and certifying Class D fire extinguishing agents has always been problematic and difficult. Read a copy of most versions of EN 3-7 and there is a glaring absence of test criteria for class D extinguishing agents, and almost no reference at all to them. In comparison, there are clear and defined performance criteria for Class A and B extinguishers. (DIN EN 3-7 is an example of where there are considerations for Class D extinguishing agents, but this is not shared between other EN3-7 versions). UL711 also provides specific test criteria for Class D extinguishing agents and in both instances, UL711 and DIN EN 3-7, there is a requirement to test the agent on magnesium (powder, swarf, chips) as well as sodium and this poses a problem where new developments of Class D agents are concerned.

Class D fires involve extremely high

temperatures and highly reactive fuels, for example, burning magnesium metal breaks water down to hydrogen gas and can cause explosions in some cases. Burning magnesium can also break halon down to toxic phosgene and fluorophosgene and may cause a rapid phase transition explosion. It will continue to burn even when completely smothered by nitrogen gas or carbon dioxide, and with carbon dioxide it can yield toxic carbon monoxide. Consequently there is no one type of extinguishing agent that is approved for all class D fires, rather there are several common types and a few rarer ones. Each must be compatibility approved for the particular hazard being guarded.

This issue has been taken up with both the BS EN Committee and with NFPA to review how Class D agents are classified. Rather than have just a generic Class D, lobbying has taken place to sub categorize Class D to make extinguishing agents more specific and into the following 2 categories;

- Flammable metals that burn as a solid (Magnesium, Titanium, Aluminium, Zirconium)
- Flammable metals that burn as a Liquid (Sodium, Potassium, Lithium)

The proposed sub categories would ensure that all existing and new fire extinguishing agents are certified to either solid metal fires, liquid metal fires or even both. Standards testing could then be tailored to ensure optimisation of extinguishing agents to the hazard present and will ensure that when a first responder tackles a fire, they at least are in possession of the right kind of extinguishing agent for the hazard, thus making the potential to extinguish the fire better and reduce the overall hazard. Also, if the first responder has been able to tackle the fire with the most effective extinguishing agent to begin with, the fire fighters arriving on the scene may be performing a role of damage limitation and securing the fire area rather than trying to contain a fire that quickly spreads in the early stages due to the wrong extinguishing agent being used in the initial stages of the fire.

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Hurricane Concerns in the Fire Service

Is your fire department or emergency management agency prepared to deal with a hurricane, typhoon or cyclone? I mention three terms but they can be used interchangeably, depending on the particular area that the storm occurs on Earth. For this article, I will use the term hurricane since that's the term I am familiar with and use most often.



Valeriano Martin

The topics discussed are issues that needed to be dealt with concerning my fire department and the challenges that we face when a strong hurricane impacts our jurisdiction. Like a tsunami or earthquake, a hurricane has the potential to affect a large number of the population at once, quickly becoming an emergency that is beyond what the local fire department can service alone. There is a level of risk that a community must be willing to accept. It is too costly to be prepared for every type of emergency imaginable and preparing to protect every citizen during a hurricane is unreasonable. However, the fire department must be able to survive a hurricane. This includes personnel and equipment. Although the devastation from a hurricane can be tremendous and deadly, there are things that a fire department can do to minimize the chance of becoming a hurricane casualty.

The fire department must also understand the roles that other emergency response agencies are responsible for. Other agencies may be government or non-governmental organizations (NGO's). Having a written plan in place between these organizations will alleviate confusion and the overlapping of tasks that need to be completed. Knowing what is expected of your fire department, and sharing those goals, is a great first step. For example, in some jurisdictions, the task of evacuating people from the hurricane threatened area is left to the police department. In other areas it may be the fire department. In any case, know who is responsible for these various tasks.

I will point out the importance of:

- A** Emergency radio communications
- B** Involving citizens
- C** Response limitations
- D** Self Preservation of responders



Valeriano Martin is Assistant Chief with the Maui Fire Department in Hawaii. He has 24 years of fire service experience.





Image courtesy of Ms. Chaman Carroll (Maui CERT Coordinator)

Emergency Radio Communications

A large emergency that covers a sizable geographic area can make radio communication requirements a nightmare for any fire department. Having too few radio frequencies or radio channels for emergency personnel can create an atmosphere of chaos. Knowing that more help is needed but not being able to communicate for help is demoralizing for a fire fighter at a scene. Waiting for a busy radio communication channel to free up can be frustrating.

My Department has 10 fire stations on one dispatch radio channel. Out of those 10 stations, there are over 20 emergency vehicles that could conceivably be activated at the same time after a tremendous storm. Although there are other available radio frequencies that we can utilize, assigning those frequencies immediately after a storm is too late. Radio channels need to be included in written policies well before the storm. Imagine the chaos that would result from 20 different crews trying to communicate with superiors on one or two channels. What channel should they use? Who else is on the channel? These are the types of questions that need to be answered prior to the event.

A very strong hurricane will likely affect radio transmission towers and

equipment. In cases like these, a satellite phone or amateur (HAM) radio may be your only option. A secondary form of communication needs to be discussed and implemented in policies. In a worst case scenario, you may need to use “runners” to transmit information. Vehicles may not be an option due to blocked or impassible roadways. Every fire department needs to have a comprehensive communication plan in place for catastrophic events.

Involving Community Members

Being able to utilize minimally trained community members for light assignments will allow fire fighters to concentrate on the more moderate and severe tasks after a hurricane. Trained community members can be assigned to assist with evacuation or easy searching of victims. They can also assist by attending to minimally injured citizens or contribute by simply assisting with documentation. The Community Emergency Response Team (CERT) is a program in the United States that promotes the training of civilians to assist emergency responders during a large emergency or disaster. CERT members are not fire fighters but they provide the ability to perform light tasks that may turn in to a moderate or severe problem if left unchecked. The key is for the fire

department to provide the training prior to the disaster.

In areas where there are no trained community members to assist the fire department, it is still useful to utilize citizens who are capable of helping. Some may wonder if citizens may be too traumatized by a devastating hurricane to offer valuable assistance. Research and past events have proven otherwise. Dr. Henry Fischer’s book “Response to Disaster” provides valuable information on the sociological impact on disaster victims and he shares research findings that show how capable survivors are after a disaster (Fischer III, 2008).

During the 2004 Indian Ocean tsunami, thousands of people lost their homes and loved ones. These survivors began to participate in search and rescue efforts immediately. Knowing this, emergency personnel must understand how to guide and accept this behavior. Having a plan to organize civilian help will reduce the chaos that may arise from uncoordinated efforts. The Fire Department, or the responsible mitigation agency, must be willing to funnel these efforts and direct the citizens during the mitigation. There are a number of benefits to this approach. First, if the fire department does not accept the assistance of the residents, the residents will participate in mitigation efforts regardless. Second, those assisting will lessen the burden of emergency sheltering space for those who may need it more. Third, allowing capable victims to perform work will help them in the healing process by maintaining their dignity and staying busy. Fourth, the responsible agency will create a better relationship with the community and gain valuable information regarding the overall aftermath of the storm.

Response Limitations

Fire Department personnel shall not respond to emergencies during a hurricane when it becomes dangerous to do so. Sustained winds in excess of 40 miles per hour shall be the signal for emergency personnel to take shelter and cease emergency operations. This does not mean that personnel shall take shelter when winds reach speeds of 40 miles per hour. A sustained wind is one which is consistent for at least one minute. Gusts of wind may reach speeds of 50 or 60 miles per hour but they may not be sustained. Only an anemometer or windmeter is capable of providing accurate wind speeds.

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Images courtesy of Ms. Charman Carroll (Maui CERT Coordinator)



In the absence of these tools, updated information might be obtained from your local weather service to determine when to take self-preservation measures.

High winds can cause debris to be flown and injure fire personnel. Roofing materials and branches from trees are already elevated and can be torn away, landing on persons and equipment. Emergency vehicles that have a large side, or high profile, may act as a wind sail and flip over. Although I have not found

studies that have shown how much wind is needed to tip an emergency vehicle over, some engineers have calculated this to be possible in extremely high winds.

Self-Preservation

Is your fire department located close to the shoreline? Can your fire station be threatened by a hurricane storm surge or intense winds? If so, do you have a secondary location to safely shelter during the hurricane? Will it be safe to shelter in the fire station? Facilities that house fire department personnel must be able to withstand high winds and rain. A recent study for my fire department has recommended that fire department facilities be constructed to withstand hurricane force winds of a category 4 hurricane (Maui, 2013). A Saffir-Simpson scale category 4 hurricane has sustained wind speeds between 130 and 156 miles per hour. When designing facilities, fire departments need to work with structural engineers and hurricane experts to determine the level of stability facilities need to be constructed to. Citizens need to understand that if the fire department does not survive a hurricane event, who is going to help immediately after the storm has passed? It is a costly decision to erect such a stable structure but a very important one the community depends on. Once the hurricane has passed, are

your fire department personnel capable of self-preservation within the fire station facility for 3-7 days? There must be enough food, water and fuel to last until assistance can arrive. Every jurisdiction is different and the length of self-preservation requirements vary. How long will it take to replenish food, water and fuel to your area after a damaging hurricane? Remote areas serviced by boat or airplanes will obviously need to stock more quantities.

Secondary electrical power is critically important. A fuel driven generator will be able to maintain refrigerators, power batteries for communication and operate computers when electrical utility service is disrupted for fire department personnel. Emergency responders need water for drinking and sanitation. Potable water systems depend on electrical pumps to maintain adequate service levels. A dependable generator is invaluable to rescuers when primary sources of electricity are unavailable. A calculation of the electrical demands must be considered to adequately size the secondary generator.

Conclusion

There are catastrophic events that can make the fire departments response difficult or unavailable. The above topics are just a few things to consider and have hopefully been thought provoking to assist your agency or department to prepare for a hurricane. Many of these topics can be interchangeable with other disasters such as an earthquake, tornado or landslide. It is important to exercise and practice any emergency plan created to identify shortcomings and pitfalls in the plan. It takes time and practice to create an effective continuity plan. It is also imperative that the plan be shared with those who need to know well before a disaster occurs.

 For further information, go to www.usfa.fema.gov/training/nfa/

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DSTS-3P4-5	5	14800	18", 4-Blade	73 lbs.	22" X 21" X 17"
DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

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Model	HP	Output (CFM)	Prop Size	Weight	Dimensions
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
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Most training programs that prepare firefighters for administrative positions have not kept up with the evolution of work as a fire administrator. Current promotional processes are often based on an antiquated assumption that a good firefighter will make a good administrator. Training firefighters to become officers should include more business principles such as balancing a budget for fiscal responsibility.



Paul J. Conway
(Ret) Asst. Chief
of Operations
– Milwaukee Fire Dept.

The role of a firefighter is more dynamic and diverse than at any other time in the history of the fire service. Firefighter education and training academies have responded to these changes by constantly updating their curricula. Competencies that cover a broad base of skills are producing recruits with a diverse set of skills in areas of technology and social skills that did not exist even a decade ago. Education and training programs have not been as responsive, though, when it comes to the changing role of fire service administrators. As firefighters consider their opportunities for advancement within an agency, they may aspire to become officers or chiefs. The assumption that characteristics a good firefighter will automatically apply to the skills required of an administrator is often incorrect and can actually work against itself. A good firefighter may fail miserably in an administrative position if they are not properly trained and versed in the fundamental business principles required to manage a department. Most officer training programs available to those who aspire to be fire administrators focus on management styles. Little if any course work is offered on the subjects of budgeting, accounting principles, and fiscal responsibility. Without providing this training, we are potentially setting the stage for failure for officer candidates at the administrative level.

Both my experience as an officer for the Milwaukee, Wisconsin, fire department and as the founder/president of a firefighting supply company have taught me the value of basic business principles in successfully leading an

organization. Knowledge and experience in firefighting contributed to my leadership skills and ability to relate to my colleagues and subordinates. This was also true when I aspired to grow my small, local company into an international supplier of equipment for fire service. These skills alone, however, could not have supported me when it came to managing the operating budget at the fire department or within my business. Being able to decipher a budget, read a balance sheet, and responsibly manage assets were my greatest leadership skills. Balancing these skills with the experience and education I had as a firefighter directly related to successful leadership no matter where I was working.

During my tenure as an officer and chief with Milwaukee fire department, I had numerous opportunities to interact with aspiring leaders within the ranks. The process for promoting firefighters to officers and higher-level positions in the department was more than adequate, but it was similar to many other promotional processes: it ran the risk of promoting someone into a position where they lacked fundamental knowledge and that could lead to being disillusioned or dissatisfied. This is where disaster can strike. A good firefighter proudly accepts a promotion only to find that they are unprepared for the business aspect of operating a fire department. Being unprepared can lead to feeling inadequate. Feeling inadequate can cause the person to leave the position or stay in spite of the frustration tainting their view of the career in their final years with the agency.

Pre-fire planning, incident mitigation,

and emergency management planning take up countless training hours for all fire departments. Planning and training focuses on safety and ensuring that firefighters remain on the job. The same should be true with training for anyone who will manage a bureau, division, or department. Key elements for success in the higher-level positions should be identified and used to appropriately prepare prospective candidates. This will ensure that they have the proper tools to function in a new arena, remain on the job, and become successful, effective leaders.

Listed below are fundamental concepts that I believe would prepare all firefighters for administrative positions as well as raise awareness of the business of firefighting.

1 Tax dollars invested in the fire department constitute the budget. Tax dollars should not be taken for granted or seen as an endless source of income. Every firefighter or emergency medical worker should have a sense of fiscal responsibility to the budget. Viewing the operation of the department as a for-profit business can curtail waste, unnecessary spending, and an attitude of abundant supply.

2 Courses in basic accounting principles to help understand a budget must be part of the curriculum offered through training divisions in the department. Firefighters should also be encouraged to consider advanced degrees in business, accounting, government, or public service administration.

3 Agencies should stress the importance of this type of business training for career advancement through modeling and mentoring. Many firefighters are not interested in the business aspect of the career because it is not as glamorous or adventurous as fighting fires. Exposing young firefighters to career options through cross training, mentoring, informational training sessions, or other professional development opportunities allows them to see the inter-relationships between departments. It also helps promote the concept of fiscal responsibility

by exposing how each division of the department is seeking a piece of the budget.

Here are ways to instill these fundamental concepts in your department.

1 Becoming fiscally responsible through an understanding of the budget may require a cultural shift. The shift can begin during recruit training and/or in the probationary process by orienting new firefighters to the fiscal function of the department. Learning how the department earns and spends money is just as important as learning about equipment, rigs, schedules, and family dynamics of the firehouse. This training can be formally infused into recruit schools or field training, but it can also be done informally through mentoring. Aligning a new recruit with a trusted veteran firefighter who has proven knowledge of fiscal responsibility can help ensure that there is a cultural change in the department. The culture change can combat the mindset that a balanced budget is not necessary because tax dollars are endless.

2 Fiscal responsibility and budgeting are not inherent skills. Larger departments that offer recruit academies for their prospective employees should add business courses that teach personal finance, spreadsheet operation, or basic accounting. This creates balance in the curriculum and helps introduce the firefighter to the need for these skills in career advancement. At higher education academies, course work to earn a firefighting or medic degree should encourage elective courses in accounting, spreadsheet operation, or finance. If departments provide educational reimbursement for firefighters to receive advanced degrees, leadership should stress the importance of any business degree rather than focusing simply on public administration.

3 Understanding the business of firefighting requires respect for all divisions within the department. When new hires join the agency, they should be introduced to all divisions and held accountable to an understanding of how all the divisions interact. This not only supports their understanding of

the capital budget of their employer, but it provides them with public relations skills. It is common knowledge that when a firefighter or medic is seen in public, he or she represents the department. That is why a uniform, professional appearance is demanded of the firefighter, the equipment, and the action they take on scene. The public also expects the firefighter to be fully knowledgeable about the department. A citizen may ask questions or make a request of a firefighter, and that person representing the department should have the knowledge to address the question or request. They may not be able to answer or respond due to the limitations of their job description, but they should be able to use their working knowledge of the department to refer the citizen to get the answer or help they need. All members of the department should respect each person's role in the department. Administration should stress early on in a firefighter's career that administrative tasks are not as glamorous or heroic as those performed on the streets. However, without effective, fiscally responsible administrators in these positions, the heroic work on the street would not be possible.

In my role as a fire administrator and president of a large company, I continually encouraged others to strive for success and am discouraged when I see someone set up for failure. Most often this happens when a person appears qualified through transferrable skills but lacks the opportunity to learn the new skills fundamental in a higher-level position. Creating the opportunity to learn the skills requires a paradigm shift in thinking through the entire department but particularly in the areas of recruitment, training, and leadership development.

Implementing the aforementioned recommendations (any part of them or customized adaptations of them) can start the paradigm shift to ensure that the most qualified candidates are in leadership positions. Begin your administrative disaster management training at the lowest possible level and start today.

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Grain entrapment rescues are complex – are you prepared?

First-responders called to a grain bin entrapment should expect the unexpected because no two situations are the same. The frequency of grain entrapments has steadily increased over the past decade as a result of record grain yields, long time in storage, larger storage tanks, and fast unloading equipment.



Kirsten Kniss

Kirsten Kniss is Sales Manager for the Great Wall of Rescue, Eastland Fabrication LLC, in Lanark, Illinois.

This article discusses grain entrapment prevention, preparation, and rescue strategies. Safe grain handling practices, confined space entry procedures, and grain rescue training can give rescuers a leg-up during an emergency. Entrants may not realize that taking shortcuts can lead to disastrous results. It is important for rural communities and grain handling facilities to understand the dangers of working with grain and take precautions when entering a grain storage structure. When accidents happen, emergency personnel must act quickly and efficiently to prevent a grain extrication rescue from becoming a recovery. Your department can be proactive in preventing grain entrapment by spreading grain safety awareness and adding a grain rescue device to your equipment.

What causes grain entrapment?

The grain handling industry is a high hazard industry; workers are exposed to dangers such as grain dust explosions, grain entrapments, falls, toxic gasses, and crushes and amputations from grain handling equipment. Of these dangers, grain entrapment is the most frequent agricultural accident. Farmers and grain elevator employees enter bins frequently to monitor grain quality, take inventory, and clean bins. 2010 was a record year for grain entrapments with 59 reported incidents and 26 fatalities. In 2013, grain entrapments accounted for 49% of all agricultural incidents in the United States. Of these 33 entrapments, 13 resulted in fatalities.

Emergency crews are a crucial part of a successful grain extrication because the process requires skill, resources, and



▲ Stateline Farm Rescue trainers build a tube and a retaining wall with the Great Wall of Rescue.

trained manpower that understands the stresses that grain entrapment puts on the human body. Grain is heavy; corn weighs 70 pounds per square foot and soy beans weigh 75 pounds per square foot. The grain's weight and frictional characteristics make it impossible to simply pull a victim out of grain. For example, it would require 325 pounds of force to pull a 165 lb. victim from 3 feet of grain. The human body can't handle that amount of force and the victim would be injured. Asphyxiation is the leading cause of grain entrapment deaths. Even considerably small grain storage, such as a grain cart, contains enough grain to exert extreme pressure on a victim's chest and inhibit breathing. The enveloping flow of grain will enter any void it can, including a victim's mouth and nose.

The nature of grain in storage is a contributing factor to the large number of incidents. Wet grain is stored in a holding tank and then through a grain drier before it is transferred to a large storage bin. The quality of grain put in storage must be monitored; moisture levels, toxin levels, percentage of foreign material, and temperature are important attributes of stored grain. High-moisture or low-quality grain can go out of condition, which leads to spoiled, sticky product that becomes hard and doesn't flow evenly when unloaded. Workers will enter storage bins to sample grain, check bin level, or investigate why

grain is not unloading properly, which may put them in a perilous situation.

Grain entrapments happen in three ways: engulfment in flowing grain, collapse of a grain bridge, and collapse of a vertical grain wall. As grain is unloaded, it flows from the top layer down a center column to the auger at the bottom of the bin, creating a cyclone effect that quickly engulfs a victim. To put it in perspective, modern bin unloading augers move up to 5,000 bushels of grain an hour, equivalent to 1.40 bushels per second. A 6 foot tall worker displaces approximately 9.38 bushels of grain. If the worker is caught in the grain flow, he could be engulfed in only 7 seconds. Some entrapments in flowing grain occur when the entrant wants to speed up the flow of grain by walking down it. In these instances, the entrant could lose their footing and become engulfed by the moving grain. (Walking down grain is a common practice, but it is prohibited by OSHA standards.) Spoiled grain creates hazardous grain bridges and vertical grain walls that may collapse and engulf an entrant.

A grain bridge is formed by the hardened surface layer of stored grain exposed to air, but conceals a void beneath the surface. The bridge can collapse under the weight of a worker walking in the grain, engulfing him instantly. Alternatively, vertical grain walls are formed when spoiled grain cakes to the side of the bin. If a worker tries to knock down the grain, it may cause an avalanche and trap the worker within moments.



Preventing grain entrapment through confined space entry procedures

Despite the dangers that exist inside a grain bin, the risks are often overlooked. Employer negligence, non-compliance with standards, and poor safety practices are a frequent cause of grain bin entrapments. The USA's regulatory employee safety agency (OSHA) classifies a grain bin as a permit-required confined space; it has limited means of entry and exit, an internal configuration that poses an entrapment hazard, and/or a potentially toxic atmosphere. OSHA Standards 1910.146: Permit required Confined Spaces and 1910.272: Grain Handling Facilities outline the required protocol of which commercial grain facilities must be in compliance, or run the risk of judiciary and monetary punishment.

Although private farms are exempt from OSHA standards, farmers should follow the same guidelines to prevent entrapment in their grain bins; roughly 50% of reported grain entrapments have occurred at farms that are exempt from OSHA standards. Grain entrapment can be prevented if entrants follow confined space entry protocol and use common sense.

Confined Space Entry Permits

A confined space entry permit is an all-inclusive form that summarizes the tasks that should be performed before, during, and after a person enters a grain bin. Every commercial facility is required to have blank confined space entry permits available and completed permits kept



▲ Victim gives a thumbs-up during hands-on training in a simulated entrapment.

on site after work is finished. Templates for confined space entry permits can be found online.

Lock-out / Tag-out Program

Locking-out the power supply to the bin will ensure that no one but the entrant can turn on the bin equipment, such as the load-out auger or bin sweep, which could move grain in the bin and cause an entrapment. Tagging the locked out bin alerts others that there is a worker inside the bin. Lock-out tag-out systems are a simple and cost effective way to prevent grain entrapment.

Monitor Air Quality

Air quality checks are vital to grain bin entry; the interior atmosphere has potential to be toxic due to spoiled grain, insecticides, and other oxygen-displacing elements. Rescuers or workers should slowly lower a calibrated air monitor inside to check air quality before entering a grain bin. Entrants must keep a four gas air monitor on their person while in the bin, as well as periodically run an air check and report levels on the permit.

Fall Protection

Commercial facilities must provide employees with personal protective equipment and proper PPE training. Harnesses and life lines prevent falls and keep the entrant from being sucked under flowing grain. Respiratory protection should also be worn to protect victim from inhaling dust and mold spores.

Observer

An observer, equipped and ready to provide assistance or call for help, must be stationed outside of the grain bin and oversee that the entrant safely performs work.

Grain entrapment rescue

Grain bin rescues will test the skill and resources of responding emergency agencies. Emergency personnel must be trained and prepared for all aspects of grain bin rescues, including high-angle, bin cutting, auger entanglement, and grain extrication. Cutting edge grain rescue equipment used along with modern grain rescue strategies can expedite a rescue. Preplanning and training with a grain extrication device are necessary to prepare your department for a grain bin rescue.

Preplanning

Familiarize your department with bulk grain storage in the area; whether it is a large commercial facility or a rural on-farm bin, a lot can be learned from seeing grain storage first hand. Identify power supplies and back-up generators to expedite a lock-out/tag-out program. Ask the facility manager for their emergency action plan and a map of the facility for reference. Take the bin structure into consideration as well; bin manufacturer, material, sheet thickness, bolt patterns, and location of stiffeners are important for the bin cutting team. Check ladder integrity, bin opening size, location of anchor points for life lines, and structures that may hinder bin entry and exit. A successful grain bin rescue requires the collaboration of a large number of personnel, and preplanning helps alleviate the complications that may arise.

Grain Extrication Strategies

This section serves only as a summary and is not thorough grain rescue training.

A successful grain bin rescue requires a tremendous effort from the rescue team inside the bin in charge of extricating the victim. The characteristics of grain make it very difficult to walk; rescuers' movement may shift grain onto the victim. The interior environment of the bin is very dark and dusty, making it difficult to see. The temperature inside a grain bin can reach extremes. The bin opening may be too small for rescue equipment. Despite the urgency to free the victim as fast as possible, hastiness may further endanger

him. The best preparation is to devise a specific strategy for each rescue, using tactics developed from hands-on grain rescue training with a grain rescue tube. The team in charge of grain extrication should be thoroughly trained and practiced in grain extrication.

Grain rescue tubes are a life-saving tool used in grain rescues. Before rescue tubes were a readily available product, rescuers struggled with the issue of grain constantly flowing back around the victim after they shoveled it out of the way; plywood and back boards were often used as a desperate attempt to hold grain back. Grain rescue tubes consist of panels connected together to surround the victim and are pressed deep in the grain, relieving pressure on the victim and serving as a retaining wall so that grain can be removed from around the victim. Rescue tubes differ in construction, connectors, price, and driving method.

The Great Wall of Rescue, a grain rescue tube manufactured in Lanark, Illinois, can adapt to suit grain rescue scenarios; there is no limit on the number of panels that can be combined. Aluminum panels are joined via anodized ball and socket connectors to surround the victim. Neighboring departments may combine Great Wall systems and expand their rescue abilities. Consider building a larger tube to surround a rescuer tending to the victim, or using Great Wall panels to form an arched wall around the rescue to divert shifting grain. Individual panels are driven into the grain, one by one, by the rescuer stepping onto a hinged "step" that hooks onto the top of a panel. As the panels are driven deeper, grain is removed from around the victim using buckets or a grain auger until he can climb or be lifted out.

A grain entrapment rescue will test the skills and resources of the responding agencies, but there are ways to prepare: understand the basics of safe grain handling, promote confined space entry procedures, and train, train, train hands-on with a grain rescue tube. Simple preventative measures like lock-out tag-out can be an asset to large commercial facilities and small private farms. The value of preventing one grain entrapment outweighs any aggravation from taking cautious steps.

For further information, go to www.greatwallofrescue.com

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West Midlands Fire Service

A transformation of the firefighter's traditional role is well underway at the UK's West Midlands Fire Service, which serves 2.7 million people at the heart of England. The brigade, which is the country's second biggest outside London, is establishing itself as one prized by its diverse communities for providing a range of services which go far beyond emergency response.

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Neil Spencer

WMFS has led the way in reducing call-out demand from emergency '999' calls, through its prevention and protection activities. Response work now accounts for just 10 per cent of its 1,322 firefighters' time.

However, a public commitment to providing a five-minute response to life or property-threatening incidents remains central to WMFS's Service Delivery Model. A focus on operational excellence means that training accounts for just over a third of a West Midlands firefighter's time on duty.

And 40 per cent of their time is now dedicated to the prevention and protection work that the service sees as crucial in enabling its communities – people and businesses – to be safe, confident and aspirational. West Midlands Fire Service believes that:

- Its five-minute attendance target should be maintained and improved
- Response should be tailored to risk
- Prevention and protection – 'upstream firefighting' – are an integral part of a firefighter and fire and rescue service's role
- Staff should be enabled to continually improve and develop.

The West Midlands has a diverse and multi-cultural population, spread across 350 square miles. It includes areas with the highest risk in England outside of London, presenting a range of socio-economic and health and well-being challenges.

Situated in the middle of England and the UK, the area has a busy road and rail network and large swathes of heavy industry. Birmingham is home to one of the UK's biggest international airports.

WMFS's Service Delivery Model takes account not only of such local risks, but national risk data as well. The service must be ready at all times to cope with

- Assertive firefighting makes a difference
- Resources should be located according to risk



Neil Spencer is Media Relations Manager for West Midlands Fire Service, based at its headquarters in Birmingham, England.





a chemical, biological, radiological, nuclear or explosive (CBRNe) emergency. It also shoulders demanding national resilience responsibilities.

Its 38 fire stations are distributed to support its risk-based, five-minute response standard. They are home to 41 standard fire engines (otherwise known as Pump Rescue Ladders or PRLs) which are complemented by a new fleet of smaller, more agile 4x4 Brigade Response Vehicles (BRVs).

The brigade has dispensed with the historic 'one size fits all' approach to response. It now works to match response to the risk posed, and dynamically increases or decreases the resources deployed to an incident as information is received.

This is achieved through:

- A varied vehicle fleet
- Varied equipment provision and flexible crewing levels
- Gleaning as much information from the caller to understand the incident being responded to
- Aligning the number of people sent to a prevention or protection activity with actual need.

Chief Fire Officer Phil Loach was born and bred in the 'West Mids'. He joined the service he now heads in 1994.

He said: "The role of a modern-day firefighter is evolving rapidly and becoming more and more technical. Training to be operationally excellent is critical. When we respond to incidents, we want to do so safely, effectively and assertively. That requires having excellent, highly-skilled and professional firefighters with behaviours to deliver meaningful outcomes.

"Our firefighters train and undertake personal development on a daily basis, and we complete more than 100 large, multi-agency exercises every year. Thanks to our training being distributed throughout the brigade area rather than at one central location, crews can train and yet still be available for emergency calls.

"We make the West Midlands Safer through effective and targeted actions. We strive to reduce risk and to limit the severity of an incident. Risk can be immediate or longer term in nature, so our decisions are evidence-based and regularly reviewed.

"We place great emphasis on maintaining and improving our frontline service delivery because we know that our communities expect us to offer the highest possible attendance standards. And we know, from our research, that safe and assertive action when we get to a scene are paramount.

"There are many ways to measure success, and a key factor is how often we prevent a fire or incident from escalating. When we restrict a fire to the room where it started, a family can remain in their home. It can also be measured by how often the fire is limited to the item that first catches light. In our delivery area, the average is three square meters of fire damage in a domestic property."

Recent research by WMFS shows that more than 71 per cent of homes where there is a fire are fitted with smoke alarms, and that survivability depends on:

- a closed door between the fire compartment and the person (prevention)
- a working smoke detector (protection)
- fire crews' attendance time (response)

Achieving the fastest response time possible is evidentially important to survivability – and not just for fires, says WMFS. It asked 20 doctors if its five-minute attendance standard was key to victims surviving serious road traffic collisions, and the vast majority strongly agreed.

Added CFO Loach: "Our operational readiness and excellence go hand in glove with the wide range of prevention and protection activities we undertake. But these aren't optional add-ons. They are essential if we're to maintain our track record of reducing emergencies, vulnerability and risk in our communities."

Perhaps one of the most surprising developments in WMFS's recent history is its growing reputation for tackling health inequalities as part of its prevention agenda.

The brigade is the first and only organisation to be endorsed by Professor Sir Michael Marmot, Director of the Institute of Health Equity at University College London. Sir Michael, who is also President-Elect of the World Medical Association, specialises in the social determinants of health – the factors which affect whether someone lives a long and healthy life.

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He has praised WMFS for clearly recognising the links between people's risk from fire and the conditions in which they live. The organisation now incorporates the so-called 'Marmot Principles' into its wide-ranging work making the West Midlands safer – with a focus on vulnerable residents and communities.

In its report 'Improving Lives to Save Lives', WMFS highlights its strategic commitment to prevention and well-being, recognising their key role in measurably reducing the number of house fires and fire-related deaths.

Sir Michael said: "I am delighted to endorse the work of West Midlands Fire Service in tackling health inequalities, and privileged to have them as a partner. They clearly recognise the link between the need to keep local people safe and the impact of poverty, deprivation and health inequalities.

"They use their trusted brand to work across the whole community, delivering a wide range of programmes, from inspiring young people experiencing difficulties to engaging with frail elderly and disabled high-risk householders.

"Fires and ill health occur in the

more deprived areas, involving people at the bottom of the socio-economic gradient – the homeless, or those living in poor quality housing, whose circumstances have led them to take up unhealthy life styles.

"WMFS deliver home fire safety checks to the most deprived and high-risk householders. They engage with members of the public of all ages and from all cultural and socio-economic backgrounds. They not only attempt to prevent fires and keep people safe, but are also involved in leading on prevention programmes from home safety to road safety.

"Their firefighters' special and trusted role in society places them in the perfect position to deliver interventions that are designed to encourage the development of confident, healthy and resilient communities."

CFO Loach added: "We now do so much more than putting out fires and rescuing people from car crashes, and our prevention work is about much more than simply fitting smoke alarms. Sir Michael recognises this, and we are extremely proud of his endorsement.

"The same West Midlands crews who turn up on blue lights and sirens when you crash your car or have a fire are the same you'll see delivering our crucial prevention work. We're often the envy of other agencies for our ability to be able to get a foot through the door.

The trust that people place in our firefighters means they're now also immersed in delivering health and well-being messages. A healthy West Midlands is a West Midlands much less prone to fire. By continuing to drive down emergencies, vulnerability and risk we can keep delivering the five-minute emergency response that our communities value so highly.

"Sir Michael's endorsement is a testimony to the dedication that our staff display every day in making the West Midlands safer."

A video showing how WMFS works with vulnerable people such as the elderly and homeless can be viewed on its YouTube channel. The brigade tweets via @WestMidsFire, and CFO Loach is @PhilipLoach.

 For further information, go to www.wmfs.net

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When quality counts – Lessons from New York

This year marks the 55th anniversary of Resusci Anne, the world's most famous life-sized resuscitation manikin, who was created by Asmund Laerdal to help teach people CPR. Since the 1960s, how we practice CPR has changed very little but advances in technology used in conjunction with a manikin shows that improving the quality of CPR can increase survival rates.



Jon Laerdal

To help us deliver quality CPR, Jon Laerdal, Managing Director of Laerdal Medical UK, talks through the evolution of CPR and how firefighters in New York have helped improve out of hospital Sudden Cardiac Arrests (SCAs) survival rates.

CPR through the years

It may be surprising to learn that CPR is a young science. It was only in 1956 that US Chiefs of Anesthesiology, Dr. Peter Safar and Dr. James Elam conducted research studies, which confirmed that life-saving resuscitation could be performed with expired air by mouth-to-mouth ventilations. The problem that lay in its application was how to train people in this skill.

In 1958, Dr. Peter Safar presented his findings at a conference of Scandinavian anaesthesiologists in Gausdal, Norway, also attended by Bjorn Lind from Stavanger Hospital (Laerdal's home town). Aware of the difficulties of training this mouth-to-mouth skill, it struck Lind that Stavanger's own publisher and toymaker should go to the US to meet with Dr Safar to discuss the making of a manikin. Following the 1958 conference, the resuscitation debate quickly gathered momentum and the next significant milestone came from Dr. James Jude, Dr. Guy Knickerbox and Dr. William Kouwenhoven in the

US, who discovered that external chest compressions could provide circulation of blood to the brain when the heart stopped beating, and increase greatly the possibility of revival.

My grandfather, Asmund Laerdal applied all his efforts to making a complete CPR training manikin for use to practice artificial ventilation and external chest compressions. The result was Resusci Anne. To date, it is estimated that 400 million people worldwide have been trained in CPR on this iconic manikin.

As time has progressed, CPR delivery has fundamentally remained the same but the resuscitation community has developed technology that now gives us a deeper insight into how the quality of CPR can be better and save more lives.

What is Quality CPR?

Going back to basics, CPR is a first aid technique that can be used if someone is not breathing properly or if their heart has stopped. The American Heart Association (AHA) describes quality CPR as a way of providing healthcare providers and healthcare systems with a tangible framework to maximise the delivering of the technique. The AHA has developed four practical metrics to support the implementation of the 2010 AHA Guidelines for CPR and ECC. The metrics used for quality CPR are:

- Minimizing interruptions in chest compressions.
- Providing compressions of adequate rate and depth.
- Allowing full chest recoil between compressions.
- Avoiding excessive ventilation.

In his excellent article entitled "Resuscitation in the City: How technology helps maintain quality CPR in New York." John Freese MD, Director of Prehospital Research at the Fire Department of New York (FDNY) describes in clear terms what each of these metrics mean.

Minimizing interruptions in chest compressions

Don't stop: Compressions are frequently "held" for airway management, pulse checks, rhythm interpretation and patient movement, as well as to change provider roles, charge the defibrillator and defibrillate. But the interruption of chest compressions reduces perfusion and survival. This means limiting the interruption of chest compressions, ideally to no more than 10 seconds.

Providing compressions of adequate rate and depth

Not too fast, not too slow, but just right: Just right seems easy enough to define. Too fast and the heart won't fill sufficiently, and there will be no blood to move forward. Too slow and the heart will fill but won't move that blood sufficiently to maintain effective circulation. The 2010 AHA Guidelines support the recommendation that compressions be delivered at a rate of "at least 100/minute."³ But they also support the concept that compressions can be too fast and probably shouldn't exceed 120 per minute. And so our "just right" rate falls within that range of 100–120 compressions per minute.

Just deep enough: The 2010 AHA Guidelines recommend that compressions be delivered at a depth of "at least 2 inches." And reviewing the



aforementioned worksheets, it's clear that the depth should probably not exceed 2.5 inches.

Allowing full chest recoil between compressions

Don't lean on the chest, just press on it: Even the slightest bit of leaning on the chest between compressions can result in positive pressures that eliminate this natural "pull" and can prevent blood returning to the chest. The chest wall needs to fully recoil after each compression for CPR to be effective.

Avoiding excessive ventilation

One and two and ... : The use of a cadence like this isn't coincidental. It accomplishes an important final goal of delivering chest compressions with the appropriate rhythm, maintaining the appropriate duty cycle, which is

the percentage of time spent pressing downward during each compression. Said another way, it's the percentage of time you spend applying pressure to the chest in order to deliver the compressions. Ideally that percentage will fall between 40–50% of the compression time, and the use of a cadence (out loud or in your head) will help achieve that percentage. However, many providers might not need the cadence because delivering 100–120 compressions per minute actually produces a natural duty cycle of ~50%. So attention to one aspect of compressions (rate) may actually help to define quality in this area as well.

Is Quality CPR being delivered?

There are numerous studies showing that quality CPR is not being delivered as extensively as it should. In a ROC study

Jon Laerdal is the Managing Director of Laerdal Medical UK. Laerdal Medical is a global corporation dedicated to helping save lives through the advancement of the cause of resuscitation and emergency care.

Going back to basics, CPR is a first aid technique that can be used if someone is not breathing properly or if their heart has stopped.



published in 2012 which examined the CPR delivered by rescue personnel 90% of them did not comply with the guidelines compression depth.

How do you know you are delivering quality CPR?

In order to know you are delivering quality CPR, it is critical to measure the different elements of the technique as the old adage goes "if you don't measure it, you can't improve it".

The 2010 AHA Guidelines not only developed the five metrics for delivering quality CPR but also examined the potential benefits of real-time CPR prompting and feedback. In fact the guidelines specifically stated "This process of quality improvement consists of ... (1) systematic evaluation of resuscitation care and outcome, (2) benchmarking with stakeholder feedback, and (3) strategic efforts to address identified deficiencies." This is where technology begins to play its part in delivering quality CPR.

The FDNY Experience

In New York City, cardiac arrest patients are transported only to cardiac arrest centres, which are hospitals that have partnered with the FDNY to provide therapeutic hypothermia and are required to provide outcomes and other data points for all cardiac arrest patients. This data is added to prehospital data and is combined with the CPR performance data derived from an Advanced life Support (ALS) monitor—the Philips HeartStart MRx and its Q-CPR technology. This master data allows the department to analyse the various aspects of CPR performance to establish benchmarks that reflect "quality CPR" and that are defined by their likelihood to improve cardiac arrest outcomes.

In a paper presented at the Resuscitation Science Symposium (ReSS)¹ in 2014 John Freese described the results of adding real-time CPR feedback to advanced life support defibrillator/monitors. The paper concluded that adding real-time CPR

feedback to a large urban EMS system's resuscitation care resulted in significant improvements in immediate survival.

In conclusion

The core components of CPR are still as relevant today as they were when first practiced in the early 1960s. The depth, rate and frequency of our compressions have changed as we have learned to perfect our skills and deliver quality CPR. Combined with advances in technology numerous research papers have shown that immediate survival rates from out of hospital cardiac arrests can be improved to the ultimate benefit of patients.

 For further information, go to www.laerdal.com

Reference

1. Abstract 72: Addition of Real-Time CPR Feedback Improves Immediate Outcomes for Out-of-Hospital Cardiac Arrest. www.circ.ahajournals.org/content/130/Suppl_2/A72

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New Car Technology: Part 2

Here is the follow up article on new car technology. This follows up where we left off from the last article and should give you some good information on vehicle safety systems.



Doug W. Cincurak

Doug Cincurak is a Captain with the city of Green Fire Department where he has served as a Firefighter/Paramedic for 29 years. Doug has extensive training experience and knowledge in vehicle extrication and stabilization. He has taught extrication and stabilization classes throughout the USA and Canada.

Seat Belt Pretensioners

The first line of defense for any person involved in a motor vehicle collision is the seat belt. Studies done by the NHTSA estimate 9,500 lives are saved every year from safety belts. They go on to say that the risk of fatal injury is reduced by as much as 60 percent for those who wear lap belts and shoulder harnesses.

Seat belt pretensioners were introduced to aid in the protection offered by the safety belt. Many seat belts have slack in them as a result of bulky clothing or the spring loaded retractor failing to cinch the belt tight to the wearer. Seat belt pretensioners are designed to deploy with the airbag and remove the slack in the seat belt thereby reducing forward movement of the occupant. Manufacturers offer two different types of pretensioners. One model retracts the buckle while the other model backwinds the seat belt spool. The models that backwind the buckle have a pyrotechnic gas generator that activates and pulls a cable down thus tightening the seat belt.

Seat belt pretensioners that backwind

the spool are generally located in the B-post. The pretensioner device is located near the spool. We must pay special attention to where the spool is located before we make any cuts on the B-post. As you can see by the photos below, the pretensioner can be located high on the B-post or low on the B-post. We must expose any area from now on before we attempt to make any cuts. We call this "Pry and Peek." Keep a short flat head screw driver with you when you are doing extrication. Take a second to pry the plastic away from the area you plan to make a cut and look to see what is behind the plastic. You may encounter a sat belt pretensioner or an airbag canister. You DO NOT want to make a cut through either one of these devices.

Once you arrive on the scene it is difficult enough to tell if the auto has a seat belt pretensioner or not. If it does, you may not be able to tell if it has deployed or not. I tell my students to cut the seat belt early to avoid any problems associated with pretensioners.

The auto manufacturers are constantly



trying to upgrade the safety of their vehicles, for example, in the new Dodge Durango they are using a new style seat belt with a Constant Force Retractor (CFR) and seat belt pretensioners in the front seat belts. This is designed to distribute the force of the seat belt according to the load that is exerted on it. CFR's are engineered to gradually release the belt webbing in a controlled manner during a sever collision. The pretensioner will tighten the seat belt while the CFR balances the load on the upper body reducing the injuries from excessive seat belt forces.

Airbags

Airbags were first introduced in the late 1960's. In 1969 the Nixon administration proposed the development of some type of passive restraint system. In 1973 General Motors installed airbags in one thousand Chevrolets for fleet customers. In 1991 President Bush signed a law requiring auto manufacturers to begin phasing in airbags in the 1994 model year.

The NHTSA estimates between 1986 and March 1, 2000, airbags have saved as many as 5,300 lives during that period. As the percentages of autos on the road with airbags increase, so will the number of lives saved.

There are many different types of airbags on the market today. Here is a brief list of the different types of airbags you may encounter.

- Steering Wheel: SRS, SIR, Airbag
- Dash: SRS, SIR, Airbag
- Seats: SIPS, SRS/Airbag, Airbag
- Doors: SIPS, SRS/Airbag, Airbag

- Knee: SRS
- A-Post/Roof: HPS
- Side Impact Curtains: IC/Inflatable Curtain
- SRS/Airbag
- Sideguard
- Head and Torso Airbag
- Head/Thorax Airbag
- Bag-in-the-Belt
- Gentle Airbag: Airbag using computer technology will deploy with less force
- Intelligent Airbags

Airbag Technology

The way an airbag works is quite simple. Vehicles equipped with airbags have an electronic control module that contains a capacitor, a master sensor and other electronic equipment. The sensor senses a front end collision, a message is sent to a pyrotechnic gas generator that then inflates the airbag in a about 1/50th of a second. Early generation airbags would deploy at about 200 mph. Needless to say this caused a lot of problems when people were hit with this type of force.

There are many manufacturers placing "second" and even "third" generation airbags into their vehicles. Airbags used today in many vehicles are deployed at a rate consistent with the collision. If the rate of speed during the collision is low, the airbag deploys much slower. If the rate of speed during the collision is high, the airbag deploys much faster. This system protects the occupants from unnecessary injury by the airbag at slower speed collisions.

There are still other types of airbags that are called "Smart Airbags" or "Intelligent Airbags" These systems

combine the sensor in the electronic control unit with sensors in the seat and the seat belt buckle. There are sensors in the seat that are weight sensitive and only deploy the airbag if someone is sitting there. The sensors in the seat belt buckle will deploy the airbag at different rates depending on whether the belt is buckled or not. There are other systems that utilize both weight and belt sensors as stated above, plus ultra sonic sensors to determine if someone is in the seat or not.

You may also see "Dual Threshold" airbags. These were first introduced in 1994 by BMW. The airbag will deploy the first stage in less severe accidents and during more severe accidents a second stage of the airbag will also deploy.

Airbag Safety

There are many different systems used in today's vehicles. Airbag and canister placement may changes from year to year on the same model. Some can even change during the same model year. When you respond to a motor vehicle accident involving a vehicle with an airbag, the first thing you want to do is protect yourself and the passenger from accidental deployment, if the airbag has not already deployed. When working near airbags, I like using the 5-10-20 rule. Keep yourself and the victims 5 inches from any side impact airbag, 10 inches from any steering wheel airbag and 20 inches from any dash mounted airbag. These airbag systems have a capacitor which can store energy to an airbag for as long as 30 minutes. You must cut the battery cables early in the rescue to remove the energy to the capacitor. This





will not guarantee the airbags will not deploy, treat all airbags as if they can and will deploy during the rescue. There are many devices available to place over the airbag to help minimize the deployment. These devices are placed over the steering column or dash to protect the victims and rescuers.

You must also pay attention to any side impact airbags that deploy from the seat and side curtains that deploy from the headliner. Side curtain airbags will deploy downward from the headliner and would certainly cause problems for a rescuer leaning into the auto. The photo below shows a side curtain airbag deployed.

During extrication operations there

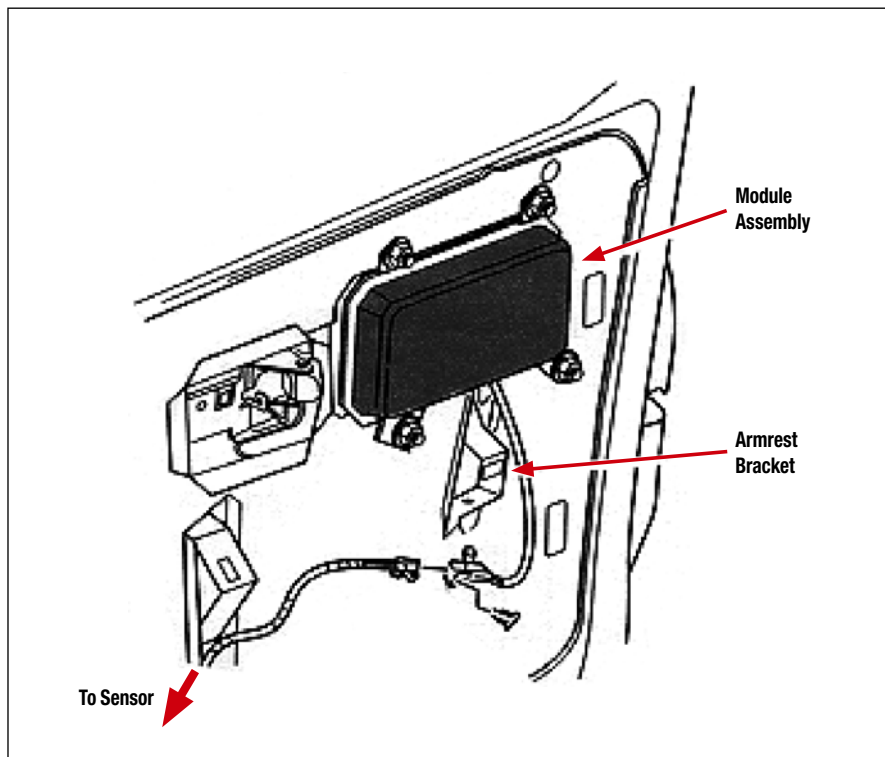
are several problems these airbags will present for us. First there are airbag sensors located in the doors and seats, traditional means of spreading the doors in these types of vehicles may accidentally set off these airbags. Care needs to be taken to avoid using you spreaders on these types of doors. The best way to remove this door is to cut the hinges, try to open the latch and roll the door off the pin or cut the pin. This will reduce the chance of putting pressure on the sensor and causing the airbag to deploy. In the photo below you can see the airbag module is placed very close to the latch side of the door.

We discussed an application earlier

called "Pry and Peek" to look for seat belt pretensioners. The same practice holds true for airbag canisters, these canisters can be located in the A, B or C post and the roof rail. Many of them have stored pressures over 3000 psi. You wouldn't want to cut into one of these because you were in a hurry and did not look where you were cutting. You have to have the mindset that no two cars are alike when it comes to the places manufacturers put airbag canisters. You must look before you spread or cut in every vehicle you encounter.

As you can see in this short article, there are many advances in the auto industry that can have an adverse effect on our day to day operation during a vehicle rescue. It is important that we learn about these advances and keep current on new technology as the auto industry introduces it. My goal for this article was to give you a little knowledge of what manufacturers are doing with vehicles today. There are many training courses available that are dedicated to new car technology and extrication techniques for new cars. This article should be a starting point for you to further your education on new car technology. Find a class that offers new car technology and vehicle extrication. Most of these classes are one and two day classes. If you have trouble finding a class, give me a call or email and I will try to help you locate a class. My phone number and email are available in the instructor bio at the end of this article.

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Copenhagen Fire Brigade benefits from drone support

By embracing new technology, Copenhagen Fire Brigade has secured a tactical overview within a few minutes of arrival at the scene of a catastrophic situation. Recently, they added drone support to their repertoire of advanced gear and are already taking advantage of the many possibilities that the drones provide.



Thomas Posborg Nielsen

With the dual mounted camera the Huginn X1 UAV, made by the Danish company Sky-Watch, is capable of taking high-resolution images and thermal imagery at the same time, making it possible to navigate both day and night. The thermal imagery also provides a unique opportunity to locate victims and fire faster than ever.

A sprouting idea

In 2013 Copenhagen Fire Brigade launched a new project in cooperation with the University of Southern Denmark to implement drone support in their daily disaster management. Drones have the ability to create a great situational overview fast, which is essential when saving lives in burning buildings. “They imagined a drone that could navigate within burning buildings, searching for

entrapped victims” – says Thomas Sylvest, Fire Captain and drone operator at Copenhagen Fire Brigade. “Quickly though, we agreed that it would take years before such technology would be ready. Instead we focused on situational overview and thermal imagery”. That is exactly what is needed when dealing with roof fires or complex structures, for instance a school or large enterprise. They are often at a scale, which makes it very hard to cover the whole area and to maintain situational overview. This can be remedied by the use of drones. The Huginn X1 UAV has an operational flight time of 25 minutes and can carry both HD and thermal camera at the same time. The thermal camera enables the possibility to monitor the fire’s progress, to determine whether the building’s safety precautions withstands or to spot hazardous skylights and preventing



Thomas Posborg Nielsen is Communication and Media Manager at Sky-Watch A/S.



potential fall risks. Thomas explains – “We have had a firefighter who got killed when he fell through a skylight. He was not aware of its existence but now we have to ability to spot them before it is too late”.

What the future may hold

High-definition and thermal imagery is only the beginning. As the UAV technology gets more stable, the focus will shift to what real-time information the platform can provide. There is no doubt about the platform’s advantages, but how can the potential be exploited? Thomas has an idea – “It would be great to minimize the use of personnel when dealing with chemical accidents for an example. A drone equipped with chemical or asbestos detection sensors would greatly reduce the major risks associated with these types of incidents”. As of now, the Huginn X1 is one of the few UAVs in the world with a basic analog chemical detection accessory kit. It uses Chameleon chemical cassettes,

by Morphix Technologies, to detect a given airborne chemical within the area. Sky-Watch is already looking into a digital solution, so that the information would be streamed in real-time to the control unit and Navigator. “In the future it will be the data collected by the UAV that will be interesting and not the UAV platform itself – different sensors, which collect data and the afterwards data processing” – Thomas continues. At the moment, Thomas and the Copenhagen Fire Brigade has developed a solution to stream the live video feed from the drone to their emergency center and incident command vehicle. A solution that makes it possible for a third party expert far away to assist the Incident Leader in his difficult decision-making. It is essential to have the right information at hand when high-risk decisions have to be made. By enabling the possibility to have specialist from all over the world look at the specific situation contributes to time-, life- and cost-saving operation handling, regardless which kind of disaster the fire brigade may encounter.

Safety and insurance

Around the world, governments face a lag of UAV regulations, as this type of flying aircrafts have not been dealt with before in such a large scale. The consequences can often be seen when individuals fly their private drones and causes near-collision accidents with commercial airplanes. In Denmark, Sky-Watch is proactive on developing regulations and is working together with UAS Denmark on dealing with this unfortunate trend. Sky-Watch offers a two and half day training course ending with a test and certificate upon satisfactory completion along with product liability insurance. “As a UAV developer and manufacturer we believe that we hold a certain responsibility that our products first of all performs as promised, but we also have to ensure that all possible safety precautions regarding user, product and environment has been made.” –says Jonas Dyhr Johansen, Vice President at Sky-Watch. He continues – “We take pride in knowing that our products has been



tested worldwide by various applications and that with all our products follows liability for the benefit of the users”.

Copenhagen Fire Brigade believes that education and regulations is the correct path to go. They are self-insured and cooperating with the Danish Transport Authority and the Danish Emergency Management Agency on collecting the right information for producing regulations. Thomas elaborates – “We are currently looking into putting a joint First Responder Drone Education together, which will be mandatory for flying within emergency management auspices”.

In-action

Thomas Sylvest is currently the only drone operator at Copenhagen Fire Brigade, as it is still a trial project. For the time being, UAVs are not a standard unit on the emergency vehicles. In the trial period drones have been used 13 times when Thomas were on watch anyway. “It only shows that they could have been used 130 times, if they were standard equipment as well as a fire hose. It all depends on which direction the organization wants to follow...” – states Thomas, as it has not yet been determined whether drones should be on watch 24/7.

On the night of August 8th 2014 the alarm sounded, sending 30 firefighters and 11 emergency vehicles to the exhibition center Bella in Copenhagen. Flames covered the rooftop of the large exhibition halls and heavy smoke quickly covered the skies. Within few hours, the firefighters got hold of the fire and secured the incident from spreading to other halls or the Bella Sky hotel. The Huginn X1 UAV were used in this case to cover the accident from the air, providing vital live footage from the huge fire devastating potential thousands of square feet. By using the Huginn X1,

the Copenhagen Fire Brigade was able to cover a large area within minutes multiple times and keep pace with the development of the fire.

With the Bella Center incident, the cost-, time- and life-saving potential of the use of UAS within firefighting is clear. It is only a matter of embracing and evolving the UAS technology.

Company profile

With headquarter in Denmark, Sky-Watch has since 2009 developed, manufactured and implemented high-tech solutions for real-time decision making in complex environments worldwide. Sky-Watch’s R&D competencies encompasses unmanned systems, advanced embedded control software, integrated industrial design and intuitive user interfaces. “The needs of our end-users are what inspire and define our product development. This is why our systems not only saves time and reduce costs, but also save lives. Our ability to create autonomous systems that can operate in very difficult environments differentiate Sky-Watch from other players in the market.” – says Vice President, Jonas Dyhr Johansen. In close cooperation with key partners in their respective markets, Sky-Watch has the ability to deliver state-of-the-art sensor technology with optimal user friendliness. A technology and user friendliness that has been tested worldwide in various situations, from SAR operations after the typhoon Haiyan hit the Philippines to counter-poaching missions in South Africa.

The UAV platform Huginn X1 supports many different applications and is only limited by your imagination. You concentrate on saving lives while the Huginn X1 concentrates on flying and bringing you essential information for you to make the right decisions.

 For further information, go to www.sky-watch.dk

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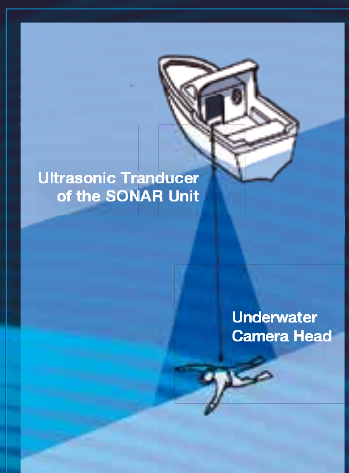
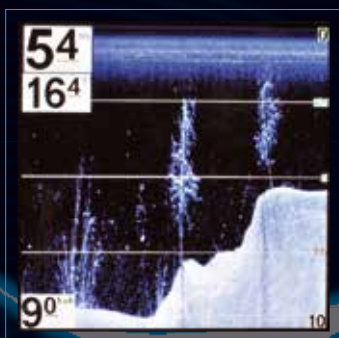
GPS System indicates exact location on the display.



Sonar Image Display



U/W Camera Image Display

**SONER Display image**

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Cover image: Industrial firefighters test their skills extinguishing flammable liquid fires with fluorine-free foam where control, extinguishing time, and burn-back resistance is paramount to the safety of firefighters. Photo courtesy of The Solberg Company

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When conditions are at their worst,
we are at our best.

THINKING AHEAD

firefighting series



Changing the culture of the Calgary Fire Department



**Fire Chief
Steve Dongworth**

Originally from Plymouth, England, Steve Dongworth joined the fire service in June 1976 and reached the rank of Station Commander. He immigrated to Canada with his family in 1991 and joined the Calgary Fire Department in 1992. In 2000, he was promoted to deputy chief and served in a variety of commands, including Operations, Training, Community Services, Administration and Emergency Management. He became Fire Chief of the Calgary Fire Department on January 1, 2015.

In January, 2015, I became the Fire Chief of the Calgary Fire Department (CFD). It is both an efficient, well-run organization and one existing in an environment of increasing diversity and seemingly endless change. What then, is required to be an effective leader in such circumstances?

Although I have been with the CFD for 23 years and a deputy chief for much of that time, when I became Fire Chief, I felt that my first task was to talk to the members, listen to their concerns and ideas and learn about what makes them proud to be a CFD member, what matters to them and what, if any, changes should be made to ensure that ours is a healthy, safe, and supportive work environment for all members. This experience has been illuminating and rewarding. It has reinforced my confidence in the strengths of the paramilitary culture of the fire service. We form close-knit teams where we rely heavily on one another and work together to serve our community. It has also confirmed that we have a great deal of work to do to recognize and embrace diversity within our organization and to support the psychological health and safety of our members.

The issue of diversity and inclusion has gained momentum, not only in the CFD, but in the larger corporation of The City of Calgary. It is so important that I have assigned a deputy chief to implement a strategy to increase and support diversity among our members. The more commonly thought of elements of diversity include gender, skin colour, race, ethnicity, abilities, religion and sexual orientation. There are others, however, such as personality, work style, work status, communication style and learning preferences. Moving toward a culture that accepts and supports individuals for the ways in which they are similar to us as well as the ways in which they are different will be no small feat. Indeed, it flies in the face of a tradition of training recruits to adapt their behaviour to match that of the firefighters senior to them. We all wear the same uniform and we must act as one at the scene of an incident but we can no longer require that members suppress their individuality, or face exclusion in the station.

Why is this important? First, because our behaviour must align with the CFD values: pride, professionalism, teamwork and respect. All of our members should be able to be proud, not only that they wear the uniform but of everything they bring to the job. They should know that at work, they will be treated as a valued member of the team. They should come to work prepared to treat their fellow

firefighters with respect and know that they will be treated in kind.

Second, it is important because we cannot fully serve our community unless it can see itself reflected in our membership. Presently the CFD membership is primarily Caucasian males. A small percentage of our uniformed members are female and an even smaller number belong to a visible minority. This limits our ability to relate to citizens as sensitively as we could and it sends a message to many youth that the fire service is not a viable career choice for them. To change this, the CFD must become a workplace that is welcoming and safe for everyone.

Third, we are now living in a world that is constantly connected through electronic media. Where we once could prevent information about the dysfunctional elements of our culture from becoming public, we are now subject to constant scrutiny. Our community has high expectations for our behaviour and we have to be seen to be living up to them.

Finally, a culture that respects and embraces diversity supports psychological health and safety. We are all too familiar with the stories of firefighters who struggle with the psychological injuries they experience as a result of the traumatic events they witness. Many face this struggle alone, afraid that they will be seen as weak, shunned by their peers and perhaps passed over for promotion if they seek help. Building a culture that acknowledges that everyone experiences trauma differently, that respects willingness to seek help and that supports its members while they work their way back to full health may be the single most important thing we, as leaders can do to protect our members.

This is a wonderful and a challenging time to be a leader in the fire service. We are constantly facing changes within our organizations and in the expectations and demands of the citizens we serve. The men and women who come to work everyday to protect the lives and property of their communities are a great source of pride. As the Fire Chief in Calgary, I feel that pride, along with a great responsibility to ensure that the members of my department come to work knowing that they will be respected not only for the job that they do but for the person they are. To that end, I believe that the best thing I can do is to lead by example and trust that every member in the CFD will do the same.



**For more information, go to
www.calgary.ca/CSPS/Fire**



HIAL airports offer life saving equipment to fire and rescue charity

Fire fighters in poorer countries are set to receive life saving firefighting equipment thanks to a donation from Dundee Airport operator HIAL.

A large consignment of old but working firefighting equipment, personal protective equipment and breathing apparatus kits has been donated to Scottish charity International Fire and Rescue Association (IFRA) by HIAL's 11 airports. Over 50 breathing apparatus sets and cylinders,

more than a hundred sets of personal protective clothing and various other types of equipment have been donated.

IFRA provides training and equipment to fire services in countries affected by poverty, war, civil unrest or natural disaster. The charity has recently sent missions to Palestine and Mexico and is currently planning missions to Paraguay and Bosnia.

Gary Johnstone, Watch Manager for

Dundee Airport Fire Service, coordinated the charity effort. He is a member of IFRA and has previously led missions to Albania and Bosnia.

He said: "I know from my own experience that IFRA plays a hugely important role in support of fire services in some of the most vulnerable parts of the world. Having led past missions to countries like Albania, I know firsthand that the equipment we have donated will make a real difference in helping to save lives."

Dundee Airport Manager Derrick Lang said: "Gary has made a tremendous contribution to the work of IFRA over the years, sharing his expertise and gathering equipment in support of fire services across the world. HIAL's airports are delighted to back this latest initiative."



For further information, go to www.ifra.co.uk

Pictured (left to right): Fire Fighter Lukas Belina and Watch Manager Gary Johnstone – Dundee Airport, Alan Kay – Stores Officer IFRA, Angela Kay – IFRA, David Kay OBE – Chairman of IFRA.

Increased demand for degradation testing of Gloves

SATRA is experiencing an increasing demand for glove degradation testing as glove manufacturers and suppliers prepare in advance for mandatory testing of chemical resistant gloves to EN 374 part 4.

EN 374-4 was published in 2013 and is a procedure that assesses the degradation resistance of chemically protective glove materials. The method is not yet mandatory but many notified bodies and companies in the protective glove supply chain are expecting it to

be compulsory when the performance requirements in the European Standard EN 374 are updated in coming months.

"One of the most important tests required to determine whether a glove is chemically protective is measuring the permeation rate of chemicals through the gloving material," explained Martin Heels, SATRA's head of chemistry. "This is a static test, however, and does not assess the dynamic performance of a material after exposure to a chemical. The principle of the EN 374-4 test is

that a change in the puncture resistance of a gloving material is measured after continuous contact with a challenge chemical."

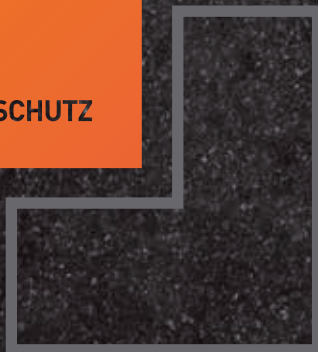
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Hainsworth

At the forefront of the health and well-being agenda

There is an increasing emphasis among the global firefighter family on the importance of health and well-being.

This is partly about the health and well-being of the people living in our communities, but just as importantly about firefighters themselves.

Hainsworth recently returned from the Fire Industry Equipment Research Organisation (FIERO) PPE symposium in Raleigh, North Carolina, where there was a lot of talk about the well-being of our firefighters.

Among the symposium's presentations was one by Keith Tyson, Director of the Firefighter Cancer Support Network (FCSN), entitled "Taking Action against Cancer in the Fire Service". Keith referred to recent studies in the United States (Study of Cancer among U.S. Firefighters,

August 2013, NIOSH/USFA Firefighter Cancer Study: Robert D. Daniels, PhD, CHP) and Scandinavia (Cancer Incidence among Firefighters: 45 Years of Follow-up in Five Nordic Countries, February 2014, Nordic Firefighter Cancer Study: Professor Eero Pukkala).

The FCSN believes that "cancer is the most dangerous and under-recognised threat to the health and safety of... firefighters".

In fact, the symposium's overriding theme, irrespective of the topic under discussion, was the well-being of the firefighter, particularly in terms of exposure to carcinogenic chemicals in smoke from fires and the risk of them passing into the firefighter either by inhalation or through the skin.

Traditionally, in the United States,

there has been a culture of trying to get to the seat of a fire as quickly as possible. As Hollywood has portrayed in films such as *Backdraft*, emerging from fires covered in dirt had become a badge of honour for many US firefighters.

It was noticeable at the Raleigh symposium how much the mood had changed. Perhaps against the backdrop of recent cancer studies, firefighters are much more interested in what is getting on to their kit and the role their kit can play in helping to reduce the risk of them contracting cancer – something which often goes undetected until they have long retired from the fire service.

▼ Hainsworth Managing Director
Tom Hainsworth who spearheads the company's PPE operation.



Image courtesy of Hainsworth

While the number of fires has decreased in recent years, the type of fire has changed. They develop more quickly and the associated smoke can be more toxic. By the time firefighters are arriving at the scene of a fire, the smoke will have built up and they will be going straight into smoke in a way that was less the case 20 years ago.

Traditionally, the dominant factor in determining choice of PPE has been which kit best protects against the threat of heat and flame. Well-being in terms of potential exposure to cancer-causing carcinogens has been less high on the agenda.

Hainsworth has for some time made the health (as well as the safety) of firefighters an integral part of its research and development at its UKAS accredited laboratory. We understand that regular washing of kit is one of the best ways to minimise health risks.

All Hainsworth TITAN Technology products are underpinned by three core messages – design that saves, protection that shows and quality that lasts.

Durability is a key consideration in the design of all products. In order to decontaminate turnout gear, regular washing is required. But durability of kit is essential due to the abrasive nature of the wash process. Hainsworth ensures its fabrics work harder to keep firefighters safer for longer; good colour fastness to light and washing; low repair and replacement rate compared with other weave and fibre combinations; and greater breathability for longer due to the unique patented construction.

All TITAN products have a high level of repellence to water, acids, alkalis and gasoline. This level of performance is achieved by the high performance and proprietary REPEL + finish which is standard on all TITAN fabrics. REPEL + is designed to keep firefighters dry and comfortable without affecting the breathability of their gear, even after repeat washing. REPEL + meets the chemical protection and spray rating requirements of EN469:2005, even after regular laundering.

Other ways in which the risk to firefighters can be minimised include:

- Minimising contact with smoke – don't go into fire and smoke if it is not necessary;



- Ensuring PPE is fitted properly, particularly at the interface between gear (neck, waist and upper legs above boots);
- Decontaminating after exposure – this can include hosing down the firefighter in their gear;
- Reduce the risk in fire vehicles – separating out contaminated gear;
- Firefighter cleaning after exposure including wiping down risk areas on skin and showering as soon as possible.

Hainsworth is unique in being able to tap into more than 150 years' experience as a manufacturer of industry-leading fabrics for firefighter PPE allied to its position as a global exporter.

While firefighters in the US are beginning to place health and well-being at the top of their agenda, their counterparts in Germany have championed this for some time. For German firefighters, cleanliness of kit is a key consideration.

The issue of firefighter health and well-being has been monitored closely in the UK during the past decade, but is now becoming an increasingly important factor in discussions around PPE procurement.

The health and well-being of the communities firefighters serve is also being highlighted in a new campaign

being led by the Chief Fire Officers Association (CFOA).

Hainsworth has agreed to be a partner in the initiative, which will include in an in-depth film being produced by ITN Productions entitled "Beyond Blue Lights".

The online programme, to be showcased at the CFOA Conference at Carden Park Hotel in Chester in September will explore the scope of the fire service and its increasing role in helping to create "healthy, safe and resilient communities".

The project is a high-profile example of the changing face of the fire service in the UK – and, indeed, internationally. The role of the firefighter has changed considerably in the past 20 years and will continue to do so. Firefighters now put out far fewer fires and play a much greater role in fire awareness within their communities.

The CFOA campaign is about positioning the fire service in its modern day and future context with a focus on promoting the health and well-being of the society it serves and demonstrating how this is best achieved by working with other Blue Light services as well as industry partners such as Hainsworth.



**For further information, go to
www.protectsyoudo.co.uk**

Seychelles Storage Facility receives Fire Fighting Technology

Nico Oberholzer from Marcé Fire Fighting Technology in South Africa has officially handed over this petroleum foam pumper to the Ray Hoareau – Operations Manager at the Seychelles Petroleum Company (SEYPEC). This specialist fire tender built, by Marcé, to the customer's specific requirements enhances the site protection team at its bulk fuel storage facility located at New Port in Victoria in the Seychelles.

The New Port installation features 28 storage tanks with a bulk liquid capacity of 188,000 cubic metres. The tender is based on an Iveco Eurocargo ML180E28 4x2

chassis featuring a 279 hp Euro 3 diesel engine and Allison automatic transmission. It makes use of modular construction with four lockers per side and a 7,000 litre foam tank.

Fire-engineering includes a German FireDos 6,000 lpm foam induction pump; a remote 6,000 lpm roof mounted monitor which uniquely recesses flush in to the body when not in use, 7 x 65 mm inlets and 4 x 65 mm discharge outlets.

As part of the scope of work, 12,000 litres of FireAde 2000 AFFF, UL tested, certified NFPA foam were also supplied to the customer.



 For more information, go to www.marce.co.za

Graduation for Aviation Firefighters

Seventeen highly trained aviation rescue fire fighters have completed an elite 11-week training course at Airservices Learning Academy at Melbourne Airport, preparing them to respond to any incident on or around the airport within a matter of minutes.

The recruits graduated at a ceremony held on April 24th having completed theoretical and practical training including fighting simulated aircraft and structural fires, aviation rescue techniques and dealing with the hazards of highly flammable aviation fuels.

Airservices Acting General Manager Learning Academy, Stuart Hansford, congratulated the graduates on successfully completing the demanding course.

"Our new recruits have developed their skills and abilities as part of a demanding 11-week training course using our state-of-the-art fire training ground and I wish them well for their future careers at Airservices," Mr Hansford said.

Aviation Fire Fighter Jake Bruce was presented with the Silver Axe Award for the most outstanding recruit of the course, and will join the ARFF service at Alice Springs.

The other recruits will be based at stations in Adelaide, Ballina, Brisbane, Darwin, Gladstone, Melbourne, Rockhampton and Sunshine Coast. At their new stations, the recruits will offer a rapid response for aviation operations as well as first aid services for medical emergencies.

Airservices Executive General Manager Aviation Rescue Fire Fighting, Michelle Bennetts, said that Airservices has one of the largest, most highly trained, professional aviation rescue fire fighting services in the world.

"The fire fighters will join highly trained teams which provide a vital layer of safety for all users of the airport. The aviation rescue fire fighting service enhances the airport's capability to safely service future growth beyond current annual traffic levels," Ms Bennetts said.

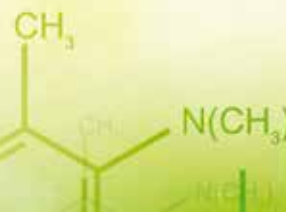
To meet increased demand and regulatory requirements at growing airports, new aviation fire stations have recently been officially opened at Gladstone Airport, Queensland and Newman Airport, Western Australia. New fire stations at Ballina and Coffs Harbour, New South Wales, are due to be officially opened in coming months.



 For more information, go to www.airservicesaustralia.com



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MetalCraft Marine

Leader in the Design and Manufacture of Aluminium Water-Jet Propelled Boats

METALCRAFT MARINE is a fully integrated designer and manufacturer of custom high performance patrol, fire, rescue, research and workboats. Boats range from 28' to 70' in length and can reach speeds of 35Kts to 60Kts. Established in 1987 MetalCraft Marine has built over 600 hulls and earned the reputation of being the North American leader in the design and manufacturing of aluminum water-jet propelled boats. MetalCraft Marine's customers include the US Coast Guard, US Navy, Marine Police, Parks Services, Port Authorities and Fire Departments.

In 2002 MetalCraft Marine developed the FireStorm – the first purpose built high speed firefighting boat. The deceptively simple design allows for high pumping capacity, straightforward maintenance and trouble-free reparability. The company build five different models of FireStorm (FS30/32, FS36, FS40, FS46/48, FS50 and FS70) and currently have 56 FireStorm's in service around the world. The FireStorm is the most practical watercraft for fire and police departments.

The FireStorm has a proven history of cross-functional emergency response and enforcement duties across multiple government agencies. The FireStorm's advantage over its competitors can be measured by its exceptional pumping

capacity and high speed over other fireboats. MetalCraft Marine's pumping configuration pushes approximately 50-60% more volume than any other pumping system available on a boat of similar size yielding the greatest firefighting capability. In addition, it can reach speeds approximately 30% higher than any other boat of similar displacement resulting in the fastest response times.

Firefighting

Amplified pumping flow rates in excess of the manufacturers rated capacities are due to a uniquely designed sea chest and inline pump arrangement. To elaborate, the Darley 1500 Gallons Per Minute rated pump can produce flow rates of 2,200 Gallons Per Minute when installed in a FireStorm 30/32 and four Hale 3000 Gallons Per Minute rated pumps can produce flow rates of 17,000 Gallons Per Minute when installed in the FireStorm 70. This translates into a maximum effective water stream distance of 430 feet and maximum effective inshore pumping of 1000 feet through a 5 inch hose.

Fast Response

Fireboats are on average 25% heavier than conventional workboats. Even with the added weight of specialized

firefighting equipment the FireStorm is able to reach speeds in excess of 42Kts and perform emergency stops and change direction within two boat lengths. The FireStorm's delta pad powerlift hull design provides more lift than a conventional 'V' type hull, which provides better trim angles over the pre-planing zone, quicker time to plane and better fuel economy. The FireStorm's stability is the result of the overwide beam to length ratio and the stepped chine flats which are below the waterline at rest. This gives the boat a high metacentric height allowing heavy loading capacity and greater performance under loaded conditions.

CBRN Defense Capabilities

MetalCraft Marine's entire FireStorm line can be equipped with Hazardous Materials and Chemical, Biological, Radiological, Nuclear and Explosive Defense systems.

Signature Elements

There are a number of design features that are exclusive to the FireStorm. The foredeck push knee allows a stable connection to a surface for safe transfers in unstable water conditions and provides acts as a collision bulkhead that can withstand a high speed impact. The oversized swim platform allows water level working space for deployment and recovery while the walk around deck can accommodate up to 4 backboards at one time during a large scale disaster. A wraparound deck house safety track system enables a crewman to attach a harness and walk unobstructed around the full perimeter of the foredeck clipped onto the boat for hands free work. Superior maneuverability while streaming water is attributed to the roof location of the primary monitor in relation to the vessel's Center of Buoyancy. The benefit is that the boat can be pivoted around the thrust load created by the high pumping capacity.



Image courtesy of MetalCraft Marine



For further information, go to
www.metalcraftmarine.com

MetalCraft Marine

I N C O R P O R A T E D

MCM is the industry leader in designing and building custom aluminum high-speed fire and rescue boats – FireStorm with a rich history of delivering quality harbor security and first response vessels to many major ports and harbors.



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Fireblitz Extinguisher Ltd.

Setting the Standards for Fire Safety Products

FIREBLITZ EXTINGUISHER LTD are a leading manufacturer of fire safety products including the Fireblitz brand of fire extinguishers and the Firehawk brand of smoke, heat and carbon monoxide alarms along with associated specialist alarms for the hard of hearing, physically impaired, vulnerable and elderly.

The company was started in 2008 following the coming together of very experienced people from the extinguisher and alarm markets. The company first designed and produced the fire extinguisher products and then in 2010 added the Firehawk brand of alarms.

Fireblitz is a fully accredited ISO9001 company and are considerate and caring to the environment. All products, where applicable, are approved to the relevant standard governing that product. The company is based in Erith, Kent, UK but supply products throughout the UK and Europe as well as the Middle East, Africa and North and South America and Australasia.

Extinguishers

The Fireblitz range of fire extinguishers extends from small aerosol type and dry powder to foam, water and CO2. The company are also the leading supplier of automatic extinguishers to the Marine industry with powder and gas versions as well as many other sectors. Products are also branded for other organisations such as the AA, Britannia Fire, Firemaster Japan and others including car manufacturers and distributors. The specialist range of 'Public Order' fire extinguishers are supplied to many UK Police Authorities for use in riot control through a National Framework agreement and are also listed on The Consortiums framework agreement for Fire Extinguishers.

Firehawk Alarms

The Firehawk alarm range has been designed and developed with over 80 years of combined experience in the sector and the products were designed with the customers and end users in mind. They are user friendly, easy and quick to install and above all built with quality and best value in mind. The Optical (Photoelectric) Smoke alarms come with Thermal Stability Enhancement technology (TSE) which is designed to reduce nuisance alarms whilst maximising the detection of smoke and heat across a range of environmental conditions. Components and batteries used in the Firehawk range are top quality and by leading brands.

The alarms include the FHB10, long life (10 year) fully sealed battery optical smoke alarm and also heat alarm (FHH10) and are now chosen as the product of choice by many UK Fire and Rescue Services (FRS).



Mains Smoke (FH250) and Heat alarms (FH450) come in the form of battery back-up (BB) or rechargeable lithium cell back up (RB) and offer the installer quicker fitting times due to the 'Fast fix' style and push fit terminals and the end user benefits from a quality, reliable product protecting them.

Firehawk carbon monoxide alarms are all fully sealed to offer tamperproof products and come with a versatile mounting system allowing them to be freestanding or wall / ceiling mounted.

Firehawk are proud to supply many FRS including North Wales, South Wales, Mid and West Wales, Devon and Somerset, Wiltshire, Gloucestershire, Tyne and Wear and the Scottish FRS. The alarms were chosen by these FRS due to the Firehawk FHB10 alarm's proven quality and value for money. The company's wide range of products can be found listed for public authorities in the UK under the 'Consortium and Yorkshire Purchasing Organisation's (YPO) framework agreements for the 'Supply of smoke alarms and associated products.'



Images courtesy of Fireblitz Extinguisher Ltd

 For further information, go to www.fireblitz.co.uk

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To view the FireHawk battery and mains powered alarms
and our range of extinguishers please visit fireblitz.co.uk



Singapore Civil Defence receives HOPE Hazmat Control Vehicle

Singapore based HOPE Technik Pte Ltd were commissioned by the Singapore Civil Defence Force to design and manufacture this stunning state-of-the-art Hazmat Control Vehicle.

This innovative Hazmat Control Vehicle is based on a Isuzu F series 4x2 chassis featuring a Euro 5: 5193 cc turbocharged diesel engine and a 4660 mm wheelbase. The rear box cabin incorporates a mild steel tubular frame with this stunning fiberglass outer body. The walls are insulated to keep the tropical heat out; while two roof mounted air-conditioning units keep the interior cool. The rear cabin is independent to the front driver's cabin and linked via an intercom system. The vehicle has kerb side access via an electronic sliding door with auto-deploy steps and also a rear

access door with a 3 metre pull out ramp. When you first step into the vehicle you are greeted by a long office table along the wall, which features a bank of 4 TV screens. Two of these screens are seamlessly joined together to enable the user to display a full sized "area-of-operations map" to display situation updates. On the opposite wall is a full length stainless steel table top that is used to perform laboratory tests of samples from the outside environment. On that stainless steel table sits a large sealed glove box that has an access port to the outside environment and also a gas chromatography mass spectrometry sampling unit that has air tubes linked to the outside environment.

The vehicle has 2 on-board super silent generators that give 4800 watts of AC power



Image courtesy of Vic Naidu - Head of HOPE Special Vehicle Operations

each. HOPE Technik came up with a power management system that allows the user to plug in an external 3 phase power plug if available, to run the systems in the vehicle; and also meshing the vehicles engine DC power to certain DC loads should the vehicle's engine be running. The generators also run off the vehicle's diesel fuel tank for extended range. The rear of the vehicle features a light mast that extends up to 12 x metres in height and on the mast itself there is a full HD tilt and pan 32X zoom camera as well as a hazmat weather station located up top on the mast. The vehicle has 3G/4G mobile network links and mobile internet connectivity. Video conferencing is possible via software in the laptops which include screen sharing as well.

The front cabin seats 2 fire-fighters comfortably and the rear cabin has individual "all-belt-to-seat" rotatable locking seats to commute a further 4 fire-fighters.

The vehicle is a one-off build for the specific requirements of the Singapore Civil Defence Force; and HOPE Technik was able to integrate a full solution for their needs. This one-off unit will set the precedence for any next and upcoming units in the following years to further enhance the Fire Department's capabilities. This first unit will be integrated into service to further evaluate and set a template to build upon for any future units.

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For more information, go to
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New Chief Fire Officer appointed for Cornwall

The Chief Executive of Cornwall Council, Andrew Kerr has announced that Paul Walker has been appointed as the new Chief Fire Officer for the Cornwall Fire, Rescue and Community Safety Service.

Mr Kerr said; "Paul took up the Chief Fire Officer role from 01 January 2015 on an interim basis whilst we undertook a national selection process for a substantive appointment. Paul has shown himself to be an outstanding candidate with vision and excellent self-awareness."



On his appointed CFO Walker said "I am delighted and very proud to be appointed as the Chief Fire Officer and Head of the Community Safety Service. I look forward to leading this fantastic service over the coming years to ensure we continue to maintain and develop our wide reaching community safety prevention and intervention services for residents, businesses and visitors across Cornwall."

Over the past five years Paul has led many change and improvement projects supporting the Service in gaining sector and partner recognition as a high performing service that embraces and delivers wide reaching and varied community safety prevention and response services.

Mr Kerr concluded; "I know that Paul is looking forward to leading the service to ensure we continue to maintain and develop our wide reaching community safety prevention and intervention services for residents, businesses and visitors across Cornwall." CFO Walker will officially commence his role on 2nd June 2015.



For further information, go to

www.cornwall.gov.uk/community-and-living/cornwall-fire-and-rescue-service-homepage/

Fire Lion Global announce industry first

Since 1988, Fire Lion Global has been involved in various phases of foam pump manufacturing, application and design. They have always focused on flammable liquid fire protection requirements and are proud to have consistently listened to the needs of their customers.

The company has just announced an industry first – a five year warranty on their foam concentrate pumps. The pumps are UL listed and FM approved and seen as the first choice for quality and reliability.

Fire Lion Global also offers world class special fire equipment and supplies and specialise in custom foam pump skids and hydraulic drive pumps for fire trucks.

Fire Lion Global will be at Interschutz in Hall 27 on stand G30.



For more information, go to
www.firelionglobal.com



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In recent years, Packexe® Ltd has also been at the forefront of rescue innovation for the emergency services. Used by Fire Services across the UK and distributed in over 20 countries around the world, well-established Packexe® SMASH is now regarded by all who use it as an essential part of extrication kit. The Time Critical Glass Management product ensures that vehicle glass is managed while extrication is taking place. With the application of Packexe® SMASH, the glass is securely held, allowing emergency personnel to cut through vehicles without risk of injury from flying glass and protection for any trapped patients inside the vehicle.

While developing SMASH, Packexe's CEO Andrew Orchard came across another issue with extrication where, as a result of extrication, cut ABC posts, broken car parts and so on left sharp hazards in the way of rescuers

and patients, with only unreliable or inflexible solutions to neutralise them. There seemed to be no convenient and quick solution for this problem, so Andrew developed Packexe® Sharpswrap, a very thick, strong adhesive tape that could be quickly and flexibly used on the sharps, leaving no exposed edges. This allows emergency personnel to continue extrication without fear of tearing damaging any PPE and, more importantly, reducing the risk of sustaining any injury. This highly-portable, versatile product is produced in a high visibility colour and is an indispensable extrication item.

At Interschutz 2015, Packexe® will be exhibiting in Hall 26, Stand K37 and will be demonstrating the latest rescue innovation: The Edge – SMASH: a hand-held version of the SMASH roll and dispenser with all the existing benefits of SMASH, in a compact size. Perfect for those who have less than average equipment or rescue space, work on small vehicles, or who need extra portability from their products.

Packexe SMASH is not just for Fire and Rescue Services. In Sundsvall, Sweden, one of the Ambulance crew is also a Fire and Rescue operative and had used the

film during extrication situations. Due to the product's strength and adhesive qualities, the firefighter suggested replicating use inside the Ambulance in order to help reduce cross-contamination from highly infectious patients, and reduce clean up time. They can now cover an ambulance interior in 12 minutes, and have successfully used this method several times in the field since trialling it.

Also, Wessex Windows, glass and glazing specialists in the UK, have recently used Packexe SMASH to help reduce glass breakage during a refurbishment of a school's very old doors and windows. Both the clear up time and the amount of glass dropped was significantly reduced, saving the company time and more importantly increasing safety on site.

To see The Edge, SMASH and Sharpswrap, visit the Packexe® Stand at Interschutz, Hall 26, Stand K37; or log on to www.packexe.co.uk, email sales@packexe.co.uk or call +44 (0)1392 328191 and find us on YouTube, Facebook and Twitter.

 For further information, go to www.packexe.co.uk



Images courtesy of Packexe Ltd.

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Globe and 3M donate over \$28K to Terry Farrell Firefighters Fund



Globe Manufacturing Company continued its partnership with the Terry Farrell Firefighters Fund at FDIC International 2015.

With its supplier partner, 3M, Globe invited attendees to try its new G-XTREME® 3.0 turnout gear on the Globe Virtual Firefighter Athletic Circuit and committed to make a donation to the Terry Farrell Firefighters Fund in each firefighter's name. This year Globe had firefighters spin a wheel to determine the donation – \$10, \$20, \$50, or \$100. In total, Globe and 3M donated \$28,080 to the Fund from the Globe Virtual Firefighter Athletic Circuit at FDIC.

"We believe in the mission of the Terry Farrell Firefighters Fund and are delighted that we've helped them make a difference in the lives of firefighters, their families, and departments over the past year," said Rob Freese, senior vice president of marketing at Globe Manufacturing Company. "Globe

has always given back to the fire service and we are proud to partner with this worthy cause and hard working group of volunteers."

Terry Farrell was a father, a husband, a brother, and a dedicated firefighter who lost his life on September 11, 2001, during the World Trade Center attack. Among the 343 heroes who died that day, he was in Tower Two when it collapsed. A decorated member of Rescue 4/FDNY and chief of the Dix Hills Volunteer Fire Department, Terry was a devoted firefighter who embodied the spirit of courage and giving. The Terry Farrell Firefighters Fund was established in his memory to assist firefighters and families across the nation with financial, educational and medical support, and to provide equipment donations for fire departments in need.

"The Terry Fund appreciates the great

partnership we have with Globe. Globe not only makes some of the best and most innovative fire gear on the market today but also strongly supports the fire service through its direct assistance to the Terry Fund," said Brian Farrell, chairman of the Terry Farrell Firefighters Fund and brother of Terry Farrell. "Firefighters across America also directly benefit from the awareness that Globe brings to the Fund."

3M is excited to continue its partnership with Globe in supporting a great cause like the Terry Farrell Firefighters Fund," said Jennifer L. Sickmann, Global Segment Marketing Manager for 3M™ Scotchlite™ Reflective Material. "The support and enthusiasm shown by firefighters at the FDIC event was impressive."

 For further information, go to www.terryfund.org



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Task Force Tips

Introducing the New Impulse Trigger Control Valve

The addition of a trigger valve control to a firefighting nozzle, while not particularly revolutionary in the global market, when integrated into Task Force Tip's unique slide style shutoff valve does offer a level of firefighting stream performance never before realized.

Unlike common twist or ball style shutoff designs, the slide valve provides total nozzle operator flow control while maintaining a hard hitting, turbulence free straight stream throughout the nozzle's rated flow and pressure range. The primary reason for this is the unique ability of the slide valve to regulate the fire flow without

disrupting the stream passing through the nozzle. In any operator selected valve position, internal turbulence is eliminated providing maximum stream reach and penetration even when the flow is restricted based on operational fireground conditions.

Traditionally, ball and even the unique slide style shutoffs have been controlled by a lever or horseshoe shaped handle that incorporates valve operation into the top of the nozzle. Common practice was to hold the nozzle's pistol grip with one hand, supporting the weight of the hose and absorbing any nozzle reaction with that arm and the body, while using the

other hand to control the valve, change gallonage selections, flush debris from the nozzle, or choose the appropriate stream pattern for protection or suppression.

Today, when the IMPULSE trigger valve system is integrated into a slide valve nozzle, operator flow control and nozzle stabilization can be achieved with a single hand allowing the other hand, without removal, to securely control stream pattern selection, flush or gallonage selection. Additionally, the trigger system automatically dampens the closure of the valve preventing unintentional and unwanted pressure spikes in the hoseline. Unlike common shutoff designs that remain open and flowing when accidentally dropped, the IMPULSE system's unique design immediately moves the nozzle's valve to the closed position preventing personal injury or the damage that often results from an out of control nozzle.

Emergency response agencies adopting the tactical use of "pulsing" as part of their interior firefighting operations have been especially accepting of the new valve operational controls. When integrated into the dozens of automatic pressure control pulsing nozzles offered with a slide valve, volume and water droplet size can be optimized for maximum cooling and suppression performance. From the first opening of the valve to full closure, these nozzles deliver consistent stream velocity from the first uniform droplet to the last.

Available as an option on 10 different series of Task Force Tips fixed, selectable, and automatic pressure control nozzles, the IMPULSE trigger valve system offers an optional trigger lock mechanism to hold a selected flow, but also allows closure with just a simple touch of the trigger. The unique ergonomic pistol grip is easily color coded for identification and compliments the overall design by greatly reducing nozzle operator fatigue.



Image courtesy of Task Force Tips



For further information, go to
www.tft.com

LHD Group

Come and See the New Lion at Interschutz 2015

LION is presenting a new generation of suits at this year's Interschutz in Hanover, the leading international exhibition for rescue, fire and civil protection and safety equipment and, with this, is setting new standards in protection, function and design.

Cologne, April 2015. In addition to its well-proven bestseller, the V-Force® protective clothing, LION, one of the leading brands in personal protective equipment is also presenting the following



innovations at the Interschutz Exhibition in Hanover from 8th to 13th June 2015:

In the Basic Range, the Kebian protective suit excels due to its exceptional price-performance ratio.

State-of-the-art textile technology such as the use of the lightest outer shell for the outer clothing for firefighters and the inclusion of the brand-new GORE® PARALLON™ Systems guarantee a unique wearing feeling in the Premium Range.

The Stationwear Range is supplemented by daily service jacket for technical support, which exhibits sufficient reflective properties for not being obliged to wear an safety vest.

Highlight at Lion's exhibition stand is the premiere of a new generation of suits, uniting in a revolutionary form new material technologies, ergonomic design and trendy design in colors.

In particular, with its V-Force® collection, the name of LION stands for well-proven comfort in wearing, which affords the wearer above average freedom of movement combined simultaneously with a high level of protection.

"We have continued this approach. Based on the latest knowledge from scientific studies on the subject of kinetics, we have experimented with various technologies and designs in the cut I order to achieve even greater freedom of movement and even more comfort in wearing. The result is a completely new suit, a unique combination of material and design." states Klaus Hawerkamp, Senior Key Account Manager, shortly prior to the official presentation. Interschutz Hanover, Hall 12, Stand E65

Portrait

For more than 110 years the LION brand has stood for functional and high-quality protective, special and service clothing. In order to achieve maximum protection



especially high standards are applied. Correspondingly, for example, NOMEX®, GORE-TEX®, PBI/Kevlar® mixtures and other technologies are used in the manufacture of protective clothing for firefighters. The company's own research department and more than 40 patents worldwide ensure product leadership. From outer clothing in accordance with HuPF via the innovative V-Force® protective clothing through to individual special custom-made products, the products manufactured by LION prove their worth daily in thousands of cases and are used worldwide, from Hamburg, via Amsterdam to Hong Kong in the protection of firefighters. Over and above the product approach, LION, with its unique TotalCare concept, provides all inclusive services for the protective clothing for firefighters. The different service modules of the TotalCare system can be individually combined in order to ensure a cost-efficient and sustainable service for the customer.



For further information, go to
www.lioninternational.com

The Annual International Service of Thanksgiving

The Annual International Service of Thanksgiving was held at the National Arboretum in Alrewas, Staffordshire, UK on Sunday 10th May.

The ceremony gave thanks to the firefighters from the UK who protect communities at home and abroad, including those who are currently assisting with the rescue efforts in the wake of the devastating earthquake in Nepal. The Service also honoured international Fire and Rescue Service colleagues.

The Firefighters Memorial Trust hosted the event, with the support of Staffordshire Fire and Rescue Service.

Staffordshire's Chief Fire Officer Peter Dartford attended the ceremony as President of the Chief Fire Officers Association alongside representatives from Fire and Rescue Services from across the UK.

Former and serving firefighters, their families and friends as well as members of the public were also invited to attend the service.

The National Fire Cadets provided a guard of honour and co-ordinated the laying of personal and Service wreaths and Alison Newis, Public Relations Manager for West Midlands Fire Service, laid a wreath on behalf of HRH The Princess Royal who is Patron of the Firefighters Memorial Trust.

The Band of the West Midlands Fire Service performed along with the Pipe Band of the West Midlands Fire Service. The Choir of Cheshire Fire and Rescue Service also performed.

Chief Fire Officer Peter Dartford said: "It is once again a privilege to welcome colleagues from across the United Kingdom to Staffordshire

for this ceremony of thanksgiving and remembrance. It is particularly pertinent at the moment with firefighters from across the UK currently in Nepal assisting their colleagues in the aftermath of the earthquake in Nepal which has claimed the lives of thousands of people.

"Firefighters risk their lives on a daily basis in order to keep the communities that they serve safe. Their courage and dedication is an inspiration as they deal with major incidents such as wildfires that can destroy entire communities to house fires and road traffic collisions which threaten the lives of those involved.

"The Annual International Service of Thanksgiving is always an incredibly moving occasion where we say thank-you to serving crew members and take the time to remember and appreciate our colleagues who have sacrificed their own lives in order to help others."

 For further information, go to www.firefightersmemorial.org.uk



Image courtesy of Stephen Tyler

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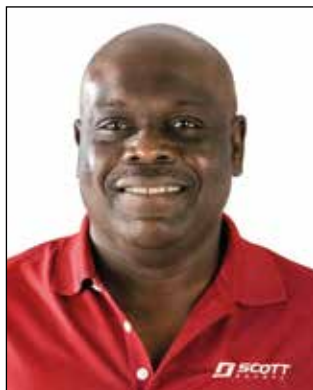
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Gas detection in the palm of your hand

Heat and flame are not the only hazards that firefighters face during emergency response scenarios. This article looks at the silent danger that exposure to harmful gas poses to the modern firefighter and how to stay one step ahead.



Milton Peters

No two jobs are ever the same. This is certainly the case for today's firefighter who can be called out to attend anything from a roadside incident, a raging fire at an industrial unit or an underground confined space rescue. Each scenario has its own set of challenges and unpredictable elements which require a list of essential items to ensure safe operation. This was certainly the case when paramedics at the Green Bay Metro Fire Department in the U.S. responded to an emergency call at a local dentist's office where a patient's health was deteriorating. The standard

issue Protégé ZM portable gas monitor attached to the officers' bag sounded an alarm alerting them to the presence of carbon monoxide, resulting in an evacuation, potentially saving the lives of 20 people in the building. Incidents such as these demonstrate why the use of a personal gas monitor is becoming one of the most crucial items in a firefighter's kit to ensure early warning of the presence of harmful hidden gases present in the atmosphere.

Gas monitor solutions have come a long way since the industry's early, unsophisticated offerings that



Milton Peters is Global Product Line Manager at Tyco.



included the use of caged canaries taken down into the mines to forewarn workers of toxic gas levels. A range of intelligent sensor technologies have been developed which are designed to detect almost any harmful gas that firefighters might be exposed to on the job. This has seen a dramatic reduction in fatalities and injuries, once accepted as an occupational hazard. Having a gas monitor close at hand provides the required level of protection if it is coupled with a clear understanding of how to use the equipment and training for the call-out scenario faced.

The Evolution of Gas Detection

The first gas monitor, introduced in the 1920s, was a device with a valve that indicated methane levels in the atmosphere. The level was detected through a catalytic diffusion sensor which burned the gas inside it to provide an accurate reading. However, each time the user wanted to see how much methane was present, they had to manually press a button on the monitor. Today, the focus has moved to developing monitor and sensing technologies to address the market demand for increasing gas sensing range, performance and reliability. Significant investment is also being made in developing solutions that are easy to use and maintain, lowering the cost of ownership for brigades and ensuring

higher user acceptance in compliance with legislation. Global regulatory standards ensure that detectors are safe for use in hazardous environments, while performance standards provide a benchmark for toxic and combustible gas detection capabilities.

A range of sophisticated portable gas monitors is now available that can detect and measure the multiple hazardous gases firefighters can be exposed to throughout their job. These monitors use a range of sensors including infrared, catalytic bead, electrochemical, photo-ionization and metal oxide semiconductor technologies. Significant enhancements have also been made in relation to the usability and reliability of monitors. Most recently there has been a trend towards the development of smarter monitors that have advanced diagnostics capabilities that can transmit data and information over wired and wireless communications protocols. As these technologies and standards continue to evolve, the number of incidents associated with exposure to harmful levels of toxic and combustible gases will continue to decrease.

For years Scott Safety has been at the forefront of these innovations, offering leading gas detection products that focus on three key areas: smarter high performance devices, enhanced connectivity, and improved user experience. These modular, scalable technology platforms have comprehensive global performance and reliability approvals. The Scott Safety Protégé is a good example. This technologically advanced, hand-held, durable multi-gas monitor detects oxygen, combustibles, hydrogen sulphide and/or carbon monoxide in emergency situations. Certified to the highest possible global performance standards, the Protégé is ergonomically designed to fit in the palm of the hand and can be used in the harshest conditions. It is also perfectly suited for confined spaces applications when configured with its optional pump.

Know Your Gases

Even the most common gases can have a devastating effect if present in the atmosphere at high enough levels. Each gas has a recommended exposure limit that can be broken down into a

permissible exposure limit, short term exposure limit and threshold limit value. Scott Safety offers a 'Gas Detection Reference Guide' that lists the different gases, possible effects, and exposure limits to help others understand potential gas risks and implications.

In an emergency response scenario, individuals are commonly exposed to Carbon Monoxide (CO), Hydrogen Cyanide (HCN) and Hydrogen Sulfide (H₂S). In confined spaces and non-ventilated areas without a monitor, a non-protected individual could be exposed to a potentially fatal dose of any or all of these. CO is often referred to as the 'killer gas' and is found in elevated levels at every fire, regardless of what is burning. It works as an asphyxiant which makes haemoglobin in the bloodstream more likely to carry CO around the body than oxygen. Too much exposure to CO can result in a condition called carboxyhemoglobin. Instead of delivering oxygen to the cells in the body, the blood delivers CO. This can lead to hypoxia, a shortage of oxygen in the body, followed by severe confusion, combativeness, and even death. Once a fire has been extinguished, harmful gases can often still be found on site, collected in air pockets within debris piles. If disturbed, this can pose an additional risk to firefighters in the surrounding area.

During the growth phase of a fire, harmful gases rise to the structure's ceiling, where they accumulate and begin creating high levels of gas pressure. Pressurisation of the room causes smoke and gases to push out of these bounds. However, once the fire is extinguished, the process reverses itself. As gases cool, they become dense and move downward in the environment. This is a potential source of toxic exposure and makes continuous monitoring a vital requirement to ensuring that firefighters remain protected.

To protect yourself and your team, atmospheric monitoring should be a continuous exercise, during the initial stages of the fire and throughout the overhaul process as gases will travel throughout the fire scene. For absolute protection, SCBAs should be worn and used throughout. Scott Safety's ProPak Self Contained Breathing Apparatus (SCBA) series that includes the ProPak-f and ProPak-fx is designed to meet the

specific demands of the professional firefighter, requiring a high specification BA set. Offering unequalled performance and user comfort, these SCBA models play a crucial role in reducing user burden and have been approved to EN137:2006 Type2, incorporating the stringent Full Flame Engulfment Test.

Thinking Outside the Confined Spaces Box

While open spaces present gas risks, confined spaces are an even greater risk of hazardous gases, fumes and vapours building up in the atmosphere. A confined space is defined as any enclosed space where there is a risk of death or serious injury from hazardous substances or dangerous conditions. While some confined spaces may be obvious, others may be less so but can be equally dangerous. For example, a firefighter visiting a house for a building check may encounter a carbon monoxide leak. As a result, the building becomes a confined space and any individuals inhabiting this space are now at threat.

Firefighters are often required to enter confined spaces, presenting an additional workplace hazard. As the risk of fatality is significantly increased if an individual is unable to recognise a confined space and its dangers, training on safe systems of work is essential. The Confined Spaces Regulations (1997) state that employers have a legal duty to ensure that a safe system of work is implemented and that there is realistic training provided to those working in confined spaces. The fire service is no exception and a risk assessment should be mandatory. Plans can then be written to address high risk activities or scenarios.

Confined spaces offer a variety of potential hazards. Access is usually limited, they are often poorly ventilated and not only can they contain combustible gases and other harmful substances, but escape or rescue from them can be difficult. Firefighters face potential dangers including exposure to toxic gases or vapours which can poison or suffocate. Oxygen deficiency is also a major hazard and can initially cause drowsiness. It can also lead to euphoria, preventing the victim from realising the dangers before it's too late. Dangers can also arise in confined spaces because of the build up of flammable gases or vapours that



can burn or explode, causing liquids or solids to suddenly fill the space, resulting in suffocation or entrapment. Respiratory protection, including airline equipment and SCBA such as the ProPak-fx, provides the required level of high specification protection to keep firefighters safe in these hazardous environments.

It is essential that the atmosphere is tested before entering any confined area and monitored throughout using appropriate gas detection instruments. Scott Safety's portable gas monitors, Protégé and Protégé ZM enable continuous monitoring and assessment of levels of hazardous gases.

Selecting the Right Gas Monitor

There are a wide range of gas monitors available that will detect harmful gases during risk assessment. For example, if an officer is performing a non-fire rescue where someone may have collapsed due to the CO level in the atmosphere, or performing a home safety visit where the CO level is unknown, a single gas detector is sufficient. However, if working in a confined space, a multi-gas monitor is essential to detect the risk posed by a number of potential gases that could be present. In almost all cases, consideration needs to be given to the presence of four main gases: methane, hydrogen sulphide, carbon monoxide and oxygen. Monitoring for the presence of one gas



will not provide sufficient protection from the potential effects of other gases on the body if present in the atmosphere. These gases are either toxic and can affect the lungs, cause illness or poisoning or are combustible, causing risk of explosion in combination with oxygen.

As with all safety equipment, unless you know how to use it properly you may not benefit from the protection the equipment can provide. It is important that you understand how to use the equipment and how to react if it alerts you to the presence of gas. It's not as simple as just turning on the gas detector. If you're working in a confined space, then confined space training that includes gas detection should be included.

Regular calibration and servicing should also be required to ensure monitors are in good condition and functioning correctly in order to protect the firefighter. Putting a servicing routine in place will instil confidence that the gas detection method selected is working and fit for purpose.

The importance of understanding the risks, putting gas monitoring procedures in place and adequately protecting against residual risks cannot be underestimated when it comes to protecting firefighters. The old adage, 'failing to prepare is preparing to fail' is true. Taking adequate precautions saves lives.



For more information, go to
www.scottsafety.com/emea



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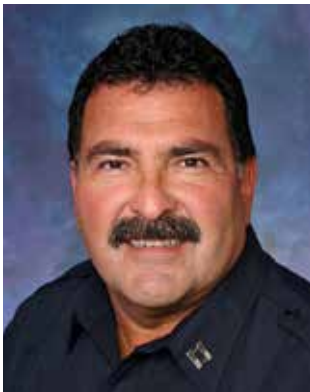
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Naked Firefighting – Ever heard the term?

Back in the 1980's I had a deputy chief named Stewart Rose who used to talk about this in his strategy and tactics classes. He would say something to the effect that if we attacked the fire properly by taking the heat out of it, we shouldn't need our structural firefighting ensemble to go in. In fact, we should be able to fight the fire buck naked.



Raul A. Angulo

Raul A. Angulo is a 35-year veteran of the Seattle (WA.) Fire Department and Captain of Ladder Company 6. He is a national author and instructor on various fire service subjects including strategy and tactics with firefighter accountability, crew development, and company officer leadership.

It is a silly term but at the time, I didn't understand what Rose was trying to convey. (I thought it was a joke.) He wasn't advocating eliminating the need for structural firefighting personal protective equipment (PPE); he was using a satirical mind picture to say that our PPE were not proximity suits – they were insurance policies and our last line of defense against a catastrophic thermal assault. Modern PPE has made us braver but not necessarily safer. The fire is still dangerous. With all the lightweight building construction and fire behavior involving modern synthetic fuels, we're not as safe as we think. The number of structure fires in the U.S. has gone down while the number of line of duty deaths (LODDs) remains about the same. So why do we feel the need to mingle with the fire in order to put it out? That's what Chief Rose was trying to say. Over the years, I finally got it, but I've never forgotten the term "naked firefighting".

The resistance to wearing Self-Contained Breathing Apparatus (SCBA) is now a thing of the past. Modern PPE and the cultural acceptance of SCBA have allowed us to become more aggressive in our tactics for interior firefighting. The strategy of attacking a fire from the uninvolved side towards the involved side is an accepted common practice and in many cases, is still the proper initial strategy to implement. It is important to get the nozzle between the fire and the victims. However, Rose understood the importance and safety advantages of transitional (defensive to offensive) and indirect fire attack. A fire doesn't get worse when you put water on it; only when you don't. While many people laughed and ridiculed him, he remained undeterred and stayed on message all these years. It took

the recent Underwriter's Laboratory (UL) and National Institute of Standards and Technology (NIST) experiments and test results on modern fire behavior and water application to scientifically validate what he and others have been saying for years.

Deputy Chief Vincent Dunn, FDNY (ret.) used to say "There's nothing new under the sun in firefighting. There's only new tools and methods to attack the same old problem." Nobody knew that better than Jim "Jaws" O'Donnell. Back in 1963, O'Donnell was a fireman in Chicago, Illinois assigned to Truck 3. Back in '63, there were no SCBAs so you really did have to be a smoke-eater. After a career of responding to fires, crawling down smoke-filled hallways, and enduring the heat, he kept thinking, "There's gotta be a better way to do this."

Together with his son, Kevin, now a 3rd generation firefighter for the O'Donnell's, they came up with a prototype fog nozzle that was mounted on a tripod to spray water out from the interior of the fire room to hydraulically ventilate it quickly and effectively. Jaws knew he wanted a hands-free unit, but this version took too long to set up, position, and stabilize. Plus, it still required a firefighter to be inside the unventilated fire room.

They decided to try the fog nozzle at the end of a pipe that could be inserted into the fire room from the outside. The local muffler shop were the only guys who could bend aluminum pipe into a tight 90° angle, but the aluminum kept collapsing; so they had to fill the pipe with sand before bending the aluminum tube. The first attempts were a series of 90° wands with disappointing results.

Switching to steel made the pipe too

heavy so they went back to heavy duty aluminum, but this time they had the pipe bent into an “S”. Having the fog nozzle positioned further in through the window, but still aiming outside, confirmed that the “S” design was the right way to go.

They tested and manufactured 45 (ventilation only) nozzles but in 1992, Jaws became ill with respiratory complications and their project stalled. All those years of fighting fires and eating smoke in the streets of Chicago finally took its toll and Jim “Jaws” O’Donnell died of lung cancer on June 12, 2002. His idea and the nozzles hung in the garage for another 10 years.

Lieutenant Kevin O’Donnell, now with the Hoffman Estates, Illinois Fire Department decided it was time to finish what his dad started. After two more years of peer input and studying the results from the UL and NIST tests, Kevin re-worked the nozzle and HydroVent™ was created.

HydroVent™

The concept is simple. HydroVent™ is a simultaneous hydraulic ventilation and fire suppression tool that is meant to be put directly into the fire room from the outside and left unmanned for the duration of the fire. The adjustable fog nozzle faces out from the window of the fire room for hydraulic ventilation and the interior nozzle, a series of straight streams, aims up and bounces off the ceiling to cool the interior temperatures of the fire room. Adding the interior straight steam nozzle is the most significant change from Jaws’ original design. Both of these simultaneous water applications make the interior IDLH (Immediately Dangerous to Life or Health) atmosphere more tenable for firefighters and victims by cooling the smoke and fire gases, preventing them from flashing over,

while venting the interior heat and smoke to the outside atmosphere. There is no other nozzle on the market that does this!

The HydroVent™ nozzle is two sections of 46-inch pipe that connect together. It comes with a pistol-grip shut-off that connects to any 1 ¾” hose line. Once connected, the 7 ½ foot pipe takes a 90° bend into the objective and horseshoes back out. The 3”x 6” window sill holder is a mini iron rake that supports the weight of the tool and keeps it from sliding. In the middle of the horseshoe bend is a 2-inch spike for breaking out windows. Next to the window breaker is the straight stream nozzle tip with 4 smooth discharge holes. The horseshoe straightens out and ends with the adjustable fog tip. The nozzle reactions are directed back towards the horseshoe and down towards the window sill. The length and weight of the pipe rests against the exterior of the building. Simply placing the HydroVent™ and opening up the nozzle secures the tool in place for hands-free operation. All the connections are standard 1 ½ inch treads. With the shut off, the unit weighs 20 pounds. It also comes with a piercing nozzle that can attach at mid-pipe for attic fires and enclosed spaces.

The length was designed to make it easy to place into any 1st or 2nd floor window – our bread and butter fires. But you can place it higher from any ground extension or aerial ladder. Come to think of it, cutting a sufficient sized hole in the gabled end of a house to hang the HydroVent™ should allow you to horizontally ventilate an attic space or cock loft by narrowing the fog pattern while introducing a sprinkler system into the space.

It could also be used at highrise fires from the floor below the fire if the window was already vented. There should be

enough reach that you could attack a fire from an adjacent balcony of a highrise unit. A highrise hose pack is available to carry the entire assembly with heavy duty padded handles and a wide, sturdy shoulder strap. An intake coupling adapter can be custom machined to accommodate any international thread.

Once in place, the fog stream hydraulically vents thousands of cubic feet of smoke and gasses per minute. This helps control and re-direct the flow path of the fire out through the window of the fire room, which is exactly where you want it to go – away from advancing firefighting teams. At the same time, water is being sprayed back into the fire room “softening the target” or “hitting hard from the yard”. Again, no other nozzle does this.

The minimum nozzle pressure is 60 psi, but higher pressures deliver more gallons per minute and increase the efficiency and speed of smoke removal with better results. The interior suppression nozzle flows 95 gpm. Once the fire is knocked down, it can manually be twisted shut while keeping the 95 gpm fog nozzle open for continual ventilation. (The HydroVent™ needs to be shut off at the pistol grip bale before you can close the suppression nozzle.) This prevents additional needless interior water damage.

The NIPSTA Tests

I attended the test burns at the Northeastern Illinois Public Safety Training Academy (NIPSTA) where Jill B. Ramaker is the Executive Director. We used two large shipping containers connected in the shape of an “L”. The smaller container was the burn room with a window for ventilation and two man doors. There was another door at the end of the 40-foot



Image courtesy of xxxxxxxx



The Super Pumper possess certain qualities similar to one of the world's most feared predators. Both the Great White Shark and The Super Pumper are relentless and efficient killers, aggressively using water and their capabilities to swiftly attack and consume their prey.

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by visiting www.FerraraFire.com/superpumper



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FERRARA



container. Firefighters could make entry to the fire room straight through the “front door” or “down the long hallway”. The fire load was four sheets of 7/16” OSB, four wooded pallets, and a full size sofa. Thermal couples were set in the fire room at 3 ft. and 6ft. to record interior temperatures. Thermal imaging cameras (TICs) and GoPro cameras recorded interior and exterior smoke and fire conditions.

We allowed the fires to really get going before all the doors were closed. Smoke filled both containers before the ventilation window was opened. Fire lapped out and up the container. (This is what first-in units often see on arrival.) The first two man doors were opened until a bi-directional vent path developed. This happens when the fire and the entry door are on the same floor. Smoke production overwhelms the vent window and looks for another path of least resistance. A bi-directional vent path is when fresh air rushes in at the bottom of the door and thick black smoke vents out at the top of the same door. It creates a little tunnel that firefighters typically crawl through to search for victims and the seat of the fire. Visibility is usually good and temperatures are around 100°F. This is why we say “stay low”. A dangerous situation occurs when a bi-directional vent path converts to a uni-directional vent path. This is caused by a wind-driven fire or a below-grade fire, like a basement. Once a basement door or window is opened, you have a low air intake. When the entry door is opened, you create a high exhaust point. The entry door is charged with pressurized smoke from top to bottom and becomes a chimney. This is where firefighters get trapped, injured, and killed. When the smoke flashes and gases ignite, that tunnel becomes a blowtorch. Firefighters cannot outrun a uni-directional

vent path once it lights off. Previous tests show that the HydroVent™ venturi pattern can reverse wind speeds between 10 and 15 mph, preventing uni-directional vent paths from occurring within this range.

The fire room temperature at 6 feet was 1303°F. The 8-foot ceiling was probably around 1500°F. – well within flashover range. Using the TIC, you could see significant rollover occurring into the 40-ft container hallway. The temperature in the hallway was about 80°F. at the floor and 500°F. at the ceiling. Once the HydroVent™ nozzle was placed into the vent window of the fire room, temperatures immediately started to drop and the rollover and smoke issuing out of the man door started to reverse itself. At 15 seconds, the fire room temperature dropped to 1061°F. At 20 seconds, the smoke venting from the window turned to white steam. At 30 seconds, the temperature was 845°. At 45 seconds, 719°. At one minute, the fire room temperature dropped to 647° – about half! And smoke conditions had dramatically cleared. At 72 seconds, the temperature dropped to 590°. That’s incredible! Additional tests yielded similar results.

What impressed me at the NIPSTA fires – the HydroVent™ hose line was the only line laid. There were no back up lines. At the house fires test, back up lines were in place but never operated because the HydroVent™ controlled all the room fires. This nozzle is a transitional attack appliance – from defensive to offensive. HydroVent™ doesn’t completely extinguish the fire. Attack crews still need to go in and finish the job, but think what this tool can do for volunteer fire departments or any department with limited resources? One firefighter can arrive with an engine, lay out the line, charge it, and insert the

HydroVent™ into a window without even entering an IDLH!

I was also amazed at how quickly the 40-foot container was cleared of smoke. The negative pressure created by the HydroVent™ in the fire room prevented the smoke from re-entering the hallway. It was like a curtain was placed at the man door! There’s no way my crew could have ventilated this structure as fast as HydroVent™ did. How many times have you seen crews having trouble starting a ventilation fan? This appliance starts to horizontally ventilate as soon as the nozzle is opened.

It is the simultaneous water applications and ventilation which makes it different from simply putting water quickly on the fire from the outside – the current recommendation from NIST and UL. This nozzle is truly revolutionary and could change the way we do fire attack in the future. It’s still fast water and first water. It directs the flow path away from firefighters and kills the flashover – making the interior safer, and increasing the survivability / rescue profile of the victims. In addition, you’re also limiting the exposure time and smoke concentrations for your firefighters. The connections between smoke absorption and cancer are well-known, so HydroVent™ is also an investment in the health, wellness, and longevity of your most valuable resource – firefighters.

I believe this nozzle will save firefighter and civilian lives. Anyone who scoffs at this new technology isn’t serious about firefighter safety. I’ve seen it for myself. And I guess – in theory – you could put the HydroVent™ into a window buck naked.



**For more information, go to
www.hydrovent.us**



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SUMMER SHOW SPECTACULAR

June 2015 sees an incredible summer fire trade show spectacular with three of the world's premier fire events taking place in the same month. Starting in Hannover, Germany is the world's largest and most famous fire show Interschutz. Next up is London, England for Firex International and finally to Chicago, USA for the NFPA Show. IFF magazine will be distributed at all three events with this special edition. To mark this once in every five year occurrence, the following Showcase highlights a selection of the industry's leading companies.



Interschutz
8th-13th June 2015
Hannover, Germany



Firex International
16th-18th June 2015
London, UK



NFPA
22nd-24th June 2015
Chicago, USA

Skedco

In 2015, Skedco, Inc. will launch the Skedco Learning Center (SLC) where you can acquire comprehensive training on many of our products. Skedco has been providing product training for as long as we have been in business. With the formation of SLC, you will be able to register for open enrollment courses here at our headquarters in Tualatin, Oregon. Our course will focus on intensive hands-on Sked Stretcher instruction, the Oregon Spine Splint II, TerrAdaptor and a Skedco Bleeding Simulation System program called the HydraSim.

Skedco offers training courses in both 1 day and 2 day format. For course schedule or any additional information about the Skedco Learning Center please check out the "TRAINING" section of our website.

 For more information, go to www.skedco.com



Tele-Lite

Tele-Lite, Inc. continues to lead the way in innovational Portable LED Floodlighting. The company are introducing the next generation of LED Lighting for the Honda EU1000 and EU2000 Generators that enhances generator performance, power output and new environmental standards.

The TEU-1.LEDTL5 and the TEU-2.LEDTL5 are both available in 120V or 12V configurations.

You can trust in Tele-Lite, Inc. as a leader in portable power and emergency scene lighting for over 40 years. Tele-Lite, Inc. takes pride in providing the kind of customer satisfaction that you expect.



For more information, go to www.tele-lite.com



Interschutz 2015

Fire fighting, disaster relief and rescue

From 8 to 13 June 2015, the gates will once again be opening on the world's most renowned exhibition for rescue workers, firefighters and related professionals – an unparalleled showcase of the latest equipment and innovative approaches to emergency rescue. Some 1,300 companies from 46 countries will be presenting their cutting-edge products and services in Hannover, Germany.

As the leading international event for firefighting and disaster relief, INTERSCHUTZ puts the spotlight on the technologies of tomorrow.

Fire Fighting

All methods of firefighting rely on starving the fire of one or more of the three things it needs in order to keep going – heat, oxygen and combustible material. In that sense, nothing has changed since the days of Ancient Egypt. What has changed is that modern firefighters are a lot more systematic in the way they go about their job. They don't just eliminate the immediate danger; they keep a watchful eye on downstream risk and damage as well. Consequently, modern fire call-outs are a lot less spectacular than in the past. That's because speed is not the only requirement; getting fires under control also calls for careful consideration – a measured approach that may sometimes appear slower and more deliberate, but which gets the job done more effectively.

Discover for yourself just how effective today's fire-extinguishing technology can be at INTERSCHUTZ 2015. In halls 13 and 27 and on the open-air site, fire protection specialists from over 40 nations will showcase their innovations and world-firsts in fire protection and firefighting technology.

Main themes

- Vehicles and vehicle equipment
- Equipment for fire stations and workshops
- Associations, organizations, service companies

Disaster Relief

At INTERSCHUTZ 2015, visitors will be able to witness the latest disaster relief and management technologies innovations first-hand. Disaster management mobilisations like these pose major logistical as well as technical challenges. Solutions for meeting those challenges – everything from rugged water purification equipment to innovative software for managing and coordinating disaster relief efforts – will be on show in the Disaster Relief display areas in Hall 26 and on the open-air site at INTERSCHUTZ 2015.

Main themes

- Vehicles and vehicle equipment
- Equipment for technical support and disaster relief
- Associations, organizations, service companies

INTERSCHUTZ
2015



Rescue

Rescue professionals, manufacturers of vehicles and medical equipment, and paramedics will be presenting the latest and greatest of these in Hall 26 and on the open-air site at INTERSCHUTZ 2015.

In the emergency and rescue services, speed is obviously very important, but so too is having properly qualified and equipped personnel. Emergency and rescue professionals work closely with manufacturers of medical equipment and vehicles to continually optimize the care and service provided by first responders. At INTERSCHUTZ 2015, they will showcase their latest results.

Main themes

- Vehicles and vehicle equipment
- Rescue, emergency, first-aid, and (para)medical equipment
- Associations, organizations, service companies

Toughest Firefighter Alive

The exciting contest for the prestigious "Toughest Firefighter" title is back again in 2015. And this time we are looking for the world champion. Preparations are already in high gear.

Interschutz 2015 Product Categories

- Associations, organizations, service companies, schools
- Equipment for fire stations and workshops
- Fire extinguishing technology, agents
- Information and organization
- Measuring and detection apparatus
- Personal protective equipment
- Rescue, emergency, first-aid, and (para) medical equipment
- Technical literature, model making, fan and gift items
- Technical support and environmental protection
- Vehicles and vehicle equipment



For further information, go to
www.interschutz.de/home





Weber Rescue Systems

Now things are getting really mobile!

B-COMPACT compact storage battery unit

The combination of the proven E-COMPACT compact unit with a battery drive means the new B-COMPACT is able to provide extremely mobile working. The battery pack is characterised by its lightweight, compact design. With a battery pack as well as the oil filling, it weighs just 11.9 kg



– for the same performance as any standard unit. Also, the B-COMPACT has enough hydraulic oil on board to be able to fully extend even the largest rescue ram.

Especially when working off-road in a remote location, good illumination is extremely important. Therefore, the unit also has 6 high-performance LEDs for illuminating the work space and for finding all operating elements directly.

For the power supply of the B-COMPACT, there are connection options for two battery packs (28 V). It can also be operated with a permanent 230 V by a power supply unit.

For heavy jobs – BC 250 and BC 250 E-FORCE concrete crushers

The BC 250 concrete crusher is suitable for the toughest applications following natural disasters, such as earthquakes and building collapse, and for

applications following industrial accidents. Even the thickest chunks of concrete can be quickly broken to provide rapid access to survivors.

The rotating handle enables optimum positioning of the crusher. Its protective shield protects again dust and fragments, and can also be turned. The tips can be replaced as in almost all WEBER RESCUE cutting equipment.

The concrete crusher can be delivered as a conventional hose-connected version (BC 250) or as a battery-operated version (BC 250 E-FORCE). The battery pack is compatible with all E-FORCE rescue equipment and the Milwaukee battery pack saws.

For more information see the Weber Rescue Team at Interschutz in Hall 26 on Stand G04



**For more information, go to
www.weber-rescue.com**

FireAde

Fire Service Plus, Inc. Established in 1998 by Ron Thames, President and Chief Executive Officer. Since 1984, Mr Thames has produces products that continue to revolutionize and change the firefighting industry. He has been awarded domestic and international patents and served on the U.S. President's small business council in an advisory capacity. Fire Service Plus, Inc. Is a recognized global leader that consistently surpasses industry standards, manufacturing the



most advanced, innovative and environmental friendly firefighting, tank cleaning and dust control products. These groundbreaking products have thirty years of pioneering research and development combined. Our products under strict quality control, are manufactured at the corporate facilities located in Fayetteville, Georgia. Fire Service Plus utilizes cutting-edge chemistry including trademarked Green Agent Technology™ to deliver superior results. Fire Service Plus, Inc is a family owned company that provides personal attention to our customers worldwide.

Fire Service Plus, Inc supports a worldwide network of dealers with our state of the art offices and manufacturing facility. This advanced 22,000 ft facility is capable of producing over 24,000 gallons of finished product daily. The storage capacity and



inventory is in excess of 100,000 gallons. This inventory coupled with a 24 hour emergency response guarantees 100% customer support.



**For more information, go to
www.fireade.com**

Ziegler

'We provide security' is the promise ZIEGLER makes to its customers. Since the foundation of the company in 1891 this promise has been consequently honored. With over 1000 employees, ZIEGLER ranks among the leading international suppliers of fire trucks and firefighting accessories.

ZIEGLER products and services are designed exactly to the respective requirements and are provided for its customers in the four strategic



segments. These are namely "Municipal", "Government", "Industrial" and "Airport". The product portfolio covers the entire spectrum of firefighting technology which ranges from operational clothing, highly specialized pumps and fire extinguishing systems to firefighting, rescue and special vehicles in each category. The types of vehicles include TSF-W for small German communities, emergency response vehicles for government agencies, large tank trucks for global chemical companies or giant airfield crash tenders for international airports.

Products that are manufactured by ZIEGLER are of the highest quality level. The highly stable, flexible and extremely durable superstructure system ALPAS, the new generation safety cab Z-cab, the operating concept of Z-control designed for optimal user friendliness: These technologies – all "made by ZIEGLER" – offer maximum operational security. ZIEGLER has

always considered security as its primary priority. Therefore, the topic of security builds the umbrella for the presence at INTERSCHUTZ in Hannover 2015. There ZIEGLER will present among other things an innovative lighting concept, a new vehicle in the segment of the airport rescue and firefighting trucks and also a pioneering development in the care of hoses. At least as interesting and so far unique in the industry is the ZIEGLER quality pass which is handed over to each customer during the delivery of a vehicle. Combined with this quality pass ZIEGLER has developed a comprehensive service package. This means "Security with seal and signature".

You will find ZIEGLER at the INTERSCHUTZ in Hannover, Germany, from 8 to 13 June 2015 in the Pavilion P 35 and on the adjacent outdoor area.



**For more information, go to
www.zieglerfirefighting.com**



Argon

Visit Argon in Hall 12 stand D44 at Interschutz to learn how our simulators have helped organisations like yours transform their Chemical, Biological, Radiological, Nuclear and Hazardous material exercises and improve student learning outcomes.

Argon's training systems allow you to enact Table Top and Live exercises within buildings or out in the open in a safe, cost effective environmentally friendly manner enabling you to comply with health, safety and environmental regulations with ease.

Come to stand D44 and see how our training systems enable you to simulate multiple hazard exercises ranging from incidents involving fires with a HazMat risk, road traffic accidents or acts of terrorism to major industrial chemical disasters such as Bhopal in India, Seveso in Italy or the Fukushima Daiichi radiological release in Japan.

Our highly realistic simulation systems enable you to create exercise scenarios that will keep your students fully engaged, and with full monitoring and recording of student activity to facilitate powerful after action reviews, you can be assured of high quality, consistent training.

We work closely with many of the world's leading detector manufacturers and training agencies to ensure our simulators are of the highest fidelity whilst ensuring your ongoing cost of ownership is minimal.

In addition to PlumeSIM, our world class disaster management training system we shall be exhibiting a range of radiological and chemical detector training systems that you are welcome to come and try for yourself.



For more information, go to
www.argonelectronics.com



Bristol Uniforms

Bristol is a leading international designer and manufacturer of advanced firefighter personal protective equipment (PPE). Based in the UK, the company supplies to municipal and industrial firefighters in over 110 countries around the world through a carefully selected and trained network of over 70 distributors in local markets.



Internationally recognised for its in-house design expertise and innovative product development programmes, Bristol is a pioneer in the development of lighter weight firefighter garments. Recently introduced new products include XFlex™ structural fire coats and trousers which form a design platform for the latest USAR kit, RescueFlex™, fire hoods and firefighter gloves. The latest LayerFlex™ garment uses 3 garments, an inner and outer fire coat and one trouser, in different combinations to satisfy EN469:2005 Level 2 structural firefighting, technical rescue, wildland standard EN15614:2007 and hi-visibility standard EN20471:2013. This reduces the number of garments required from the usual six to three.

Regularly exhibiting at national and international fire shows, including A+A, Intersec and Interschutz, is part of the support we

provide for our distributors who work with us at these shows. We also support them at national exhibitions. Every other year a three-day conference is held in Bristol to which all distributors are invited. Exhibitions provide us with an opportunity to demonstrate innovation and showcase new product designs and enhance our international presence.

During Interschutz, Ivan Rich, Bristol's Technical Manager, will be on hand to provide one-to-one technical workshops on 9 and 10 June and update distributors on PPE standards and offer training, as required. These half hour sessions are already booking well.

Visit Bristol at Interschutz in Hall 12 on Stand D67.



For more information, go to
www.bristoluniforms.com



Cold Cut Systems

Cold Cut Systems (CCS) delivering Cobra innovation to enhance safety and fire fighting capability. The coldcut™cobra cutting extinguisher is a highly effective fire fighting system which has been developed and refined following in excess of 15 years of high end engineering and design input in Sweden.

Providing a very high velocity water jet, operating at 300bars and 200 m/s, it is capable of being directed to any external surface of a compartment. An entrained abrasive creates a rapid piercing effect, which is immediately followed by a very fine spray with droplets of less than 70 microns. The consequence is that fire crews have no need to enter until the internal fire conditions are controlled and the heat is significantly reduced.

Its ability to cut through an external wall is very striking, but the speed at which it reduces the heat within the compartment is even more impressive, enabling firefighters to rapidly enter the fire

compartment to complete operations. In effect it uniquely provides the means by which firefighters can very quickly attack and control an internal fire, during its highly dynamic and hazardous early stages, from the safety of a position outside the compartment. Its very efficient use of water, just 60 litres per minute, provides the capability to significantly reduce damage to property and offers very clear environmental advantages.

The coldcut™cobra has been a big part of Scandinavian firefighting for a long time. In fact the oldest unit is still operating in Sweden as a front line firefighting resource 15 years after purchase. At present over 700 coldcut™cobra systems are being used worldwide in 30 countries, with approximately 250 being deployed in Scandinavia and the UK alone.

Cobra's capability is convincing more and more fire and rescue services to fully integrate it into front line firefighting provision. CCS feel that

the coldcut™cobra should be seen as a significant addition to firefighting capability and operational safety, and places a lot of importance on the method as well as the product. By working closely with its network of training academies and directly with its growing base of customers, CCS are confident that Cobra will become an even more integral part of firefighting operations world wide.



For more information, go to
www.coldcutsystems.com



2015 “Year of security!”

Albert Ziegler GmbH Board of Management



08. – 13. JUNE 2015
P 35 + OUTDOOR AREA



MetalCraft Marine

MetalCraft Marine's FireStorm 40 is a no compromise pumper. And the Anne Arundel Fire Department, which took delivery of it FS 40 in 2002, is ample testimony to the fact that this robust and unique design is still going strong. MetalCraft continues to build the dependable and now familiar vessels, delivering one hull to the St. Louis Fire Department in 2014 and at present, they are building two vessels for the Vancouver Fire Department in British Columbia.

The pumping arrangement enables the boat to pump water for fire suppression at maximum capacity while maintaining maneuverability. This allows the boat to act as a hydrant with an endless supply of water for supporting land units while remaining on station under its own power. One primary patient care berth with specialized storage for fire, response and medical equipment is incorporated into the cabin. There is a full cuddy

with head and sink and two secondary patient care berths for emergency response.

When fitted with two 1750 GPM rated firefighting pumps the FireStorm 40 can produce flow meter results of 4,000 GPM at 150 PSI and 4,800 GPM at 60 PSI. A remote operated monitor mounted on the roof provides the primary firefighting capability from a dedicated console within the cabin and secondary monitor(s) is mounted on the bow. Two 2.5" discharges and a 5" Storz outlet are fitted on the aft deck.

Twin diesel inboard engines matched to water-jet propulsion units can propel the boat to speeds of 38 knots and allow the boat to perform emergency stops and change direction within two boat lengths. The added beam and length produce an over wide ratio providing a massive aft work deck that has a heavy

loading capacity and greater performance under loaded conditions.

For more information visit us at Interschutz, Hannover June 8th – 13th on Stand K18 in Hall 27.

 For more information, go to www.metalcraftmarine.com



Hytrans Systems

Hytrans Systems BV are based in The Netherlands and manufacture the Hytrans Fire System (HFS). HFS is an innovative mobile water supply system for fire brigades, civil defence and industries. The mobile system provides large volumes of water over several kilometres from locations with difficult access. The high volume pump system is called the HydroSub, which is a hydraulic-driven submersible floating pump that is fed via 60 meters

of hydraulic hose and a diesel driven power pack. This enables the submersible pump to be hand carried to locations where it is impossible to use standard suction pumps due to the limited length of the suction lines. The floating pumps have no draft loss, even when pumping the water vertically to a height of 60 metres. HFS also features large diameter hoses (up to 300mm in diameter), hose laying containers and hose recovery systems.

The Hytrans Fire System has proven to be very effective during incidents such as the Buncefield oil terminal fire in the UK, the Dalian pipeline explosion in China and, recently, the Fukushima Nuclear reactor disaster in Japan. This is due to their high capacity, quick deployment, easy operating, modular configuration and flexibility.

Besides a fast deployment, it is also a "must" to recover the system quickly. If you look at training on the system, it is essential to make recovery quick and easy. When training is easy, it will be done more often and this will lead to more skilled people. The more training the better prepared for action.

For more information visit us in Hall 27, Stand B10 at Interschutz 2015.

 For more information, go to www.hytransfiresystem.com



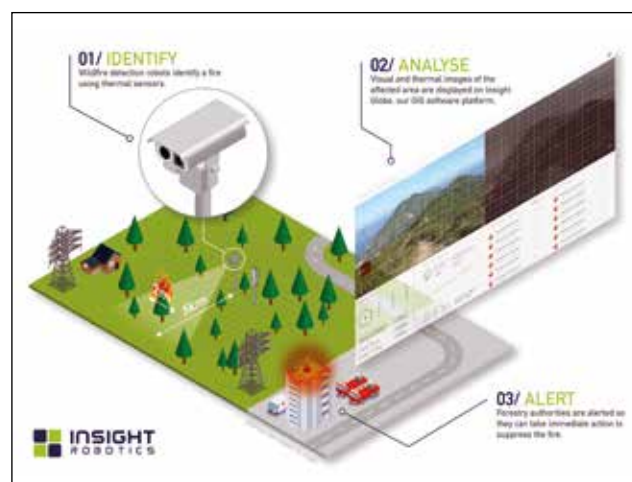
Insight Robotics

The Insight Robotics Wildfire Detection System is the leading solution for long distance 24-hour wildfire detection. It is the first in the world to spot a heat source as small as a single 2m x 1m tree within a 5 km radius. Armed with real-time image feeds, precise coordinates, microclimate data and alerts sent directly to any device, frontline command centres can draft highly efficient firefighting plans much earlier than other methods, including smoke detection.

The Insight Robotics Wildfire Detection System is formed by a network of fully automated InsightFD1 robots equipped with advanced thermal sensors and powered by proprietary software algorithms. The system leads the industry in:

- Coverage – Each InsightFD1 robot with sensors can scan up to 80 sq km of forest and wildland area
- Accuracy – Our fully automated system has a proven 100% detection rate
- Response times – Our system reduces response times from three hours to just 15 minutes

In dealing with wildfire, every minute is important. Insight Robotics is reinventing how industries manage large-scale risks quickly, accurately and cost-effectively through revolutionary applications of proven technology. Because if you can see the tree, you can save the the forest!



 For more information, go to www.insightrobotics.com

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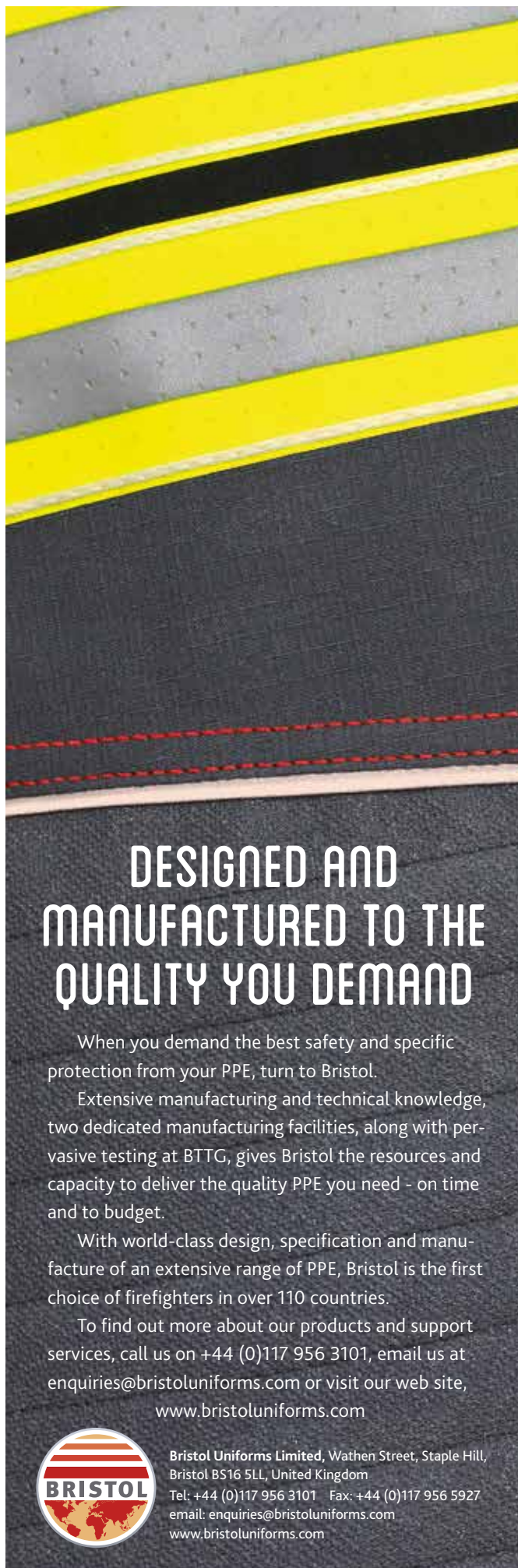


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Peli Products

With safety and efficiency in mind, Peli Products, the global leader in the design and manufacture of advanced portable lighting and high-performance protective case solutions, presents at Interschutz (Hall 12 – Stand C36/1) its latest lighting solutions, including a new ATEX Certified Safety light.

Peli's advanced lighting tools are innovative and tough, and trusted since 1976 by professionals working in the fire and rescue, mining, pharmaceutical, hazmat and other high-risk industries. A selection of the NEW Peli solutions will be showcased at Interschutz:

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- Up to 4.000 lumens (calculated)
- Multi-position deployable mast that telescopes up to 60 cm
- Up to 28 hours of run time
- 3 pre-set light levels

For more information visit us at Interschutz in Hall 12, Stand C36/1.



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Savox

Savox Communications has been a long-time leader in the provision of life detection solutions for disaster response users around the globe. Its Delsar LD3 seismic / acoustic listening device, and its Searchcam 3000 camera solution are two of the most widely used pieces of equipment for victim-detection in use today with Medium and Heavy USAR Teams.

In addition, a variation of these items for the basis for the company's Hasty Search Kit, which provides Light USAR teams and other

rapid response first responders with a rapid detection and location system that can be deployed prior to the late arrival of Medium and heavy teams. Now, following extensive and long-term user feedback, Savox has combined its core skills in communications and search and rescue and launched the Rescuecom solution, which provides USAR teams with a means of communications for life-detection device operators that has never before been done.

Its arrival will have potentially major time-saving/life-saving impact on the efforts of these operators in locating survivors and communicating urgent needs in real time by voice over two-way digital radio, cellphones / smartphones, or tablets.



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The Right Response to CBRN and HazMat

The range of potential threats makes CBRN (Chemical, Biological, Radiological, and Nuclear) / HazMat (Hazardous Materials) response training a challenging business. However, electronic simulation equipment is making significant advances in effectiveness of exercises.



Steven Pike

In recent years, the work of the emergency services has become increasingly difficult. Financial cut backs, increasing regulatory burden and inter-agency co-operation protocols all contribute to placing considerable pressure on individual service personnel, equipment and procedural systems. This situation is exacerbated by the rapid rise in the breadth and complexity of incidents that emergency services personnel have to address, and by the growing range of skills and knowledge that first responders are expected to retain and renew. Although often overshadowed by more common day-to-day incidents, the delivery of a comprehensive response to HazMat (Hazardous Materials) and CBRN (Chemical, Biological, Radiological, and Nuclear) events requires specialised consideration and attention that can only be neglected with acceptance of extreme consequences.

In preparing for HazMat and CBRN reaction and remediation, training exercises need to be not only regular, but also challenging. Training should stretch participants, and not permit them to just go through the motions. If trainees are not challenged, they are not alert; and if they are not alert, they are not learning – or, at least, not learning to a level that will assure optimum performance in the face of the most severe of circumstances. Hazmat and CBRN training must encourage the trainee to behave as if the exercise was a real event.

This is particularly true now that the emergency services are faced with many different challenges and no two incidents are ever the same. In recent years, the number of potential causes of incidents has increased considerably, ranging from the dangers of entering

methamphetamine laboratories to dealing with the threat of terrorist attacks, particularly involving devices such as so called dirty bombs.

To demonstrate the diverse range of threats faced by first responders, consider the very different issues posed by the rise of methamphetamine laboratories, which put both the public at large and responders themselves at risk. The need to flush out these laboratories is urgent; in addition to the risk of explosion there is a serious and constant threat posed to the environment and local residents by the chemical contamination from the hazardous waste of these laboratories.

Chemical reactions that occur during the manufacture of methamphetamine are so toxic that they can produce hazardous vapours that permeate walls, carpet, plaster and even the wooden structure of a building. Hazardous events at methamphetamine laboratories are on the rise and few of those arrested for manufacturing methamphetamine are trained chemists. This adds to the danger because these “cooks”, who have little or no chemical training and learn their formulas from other cooks on the Internet, are playing with chemicals that are highly corrosive or flammable. Some chemicals will react with each other – or even water – to cause a fire or explosion, or emit vapours that attack mucous membranes, skin, eyes, and respiratory tract.

Such dangers pose a whole host of issues but, historically, CBRN response training has involved trainees carrying real detection instruments, searching for small quantities of simulants and even, in the case of training for nuclear hazards, responding to hand-written signs showing the level of radiation present at a given

**Steven Pike is Managing
Director of Argon Electronics.**



response training simulator that provides enhanced flexibility and ease-of-use in field exercises and table top training for counter terrorism, HazMat or nuclear incidents.

It is designed on a Windows platform and allows multiple trainees to be managed and monitored from a computer at a central location. The software enables users to plan exercises on a PC or laptop without system hardware, offering a portable simulation system with easy-to-use menus that can be swiftly set up and used to create a diverse variety of virtual emergency scenarios. The instructor can plan a scenario that involves either single or multiple releases of hazardous materials and offers the potential to define a series of release characteristics, such as duration, persistence and deposition, for an extensive choice of substances. The instructor setting the training exercise can even define the environmental conditions that would affect the movement and/or state of the virtual plume during the timespan of the operation.

The instructor determines the parameters of the exercise using the Planning Mode, where a common file format image map of the selected training area is utilised. By placing a virtual release source at any location on the map, simulated chemical and/or radiation plumes or hot spots can be created. Selection of environmental factors including the wind direction, its velocity, and temperature can then be made and, on activation of the exercise, an onscreen counter will display the exercise scenario progression in real time. Thus, in as little as a matter of minutes, a complex training exercise can be set up rich with variables that will truly challenge the trainees to think and act as they would in a real life situation.

Trainees can interact in three modes: table top mode, field exercise mode and post-event exercise review mode. Table top mode offers the opportunity for trainees to navigate a projected on-screen scenario using a standard gamepad controller, offering a level of familiarisation with the simulators that enables them to gain more from the subsequent field training exercises. Field exercise mode enables them to physically investigate a training area, where the system triggers readings and alarms on the simulation tools they carry by locally re-broadcasting the threat scenarios from deployed personal player units that track their progress using GPS

location. These methods have of course been useful in training responders to deal with CBRN threats but compared with the options available today, they are severely limited.

For example, using real detectors in training temporarily takes equipment out of service. Worse still, it poses the risk of it being damaged and decommissioned for a far longer time while it is repaired, recalibrated or replaced. There are also personal risks to trainees during exercises that involve simulants of hazardous substances, since even small quantities of this material can pose a real health hazard. As for using hand-written signs as indicators of the presence of radiation, this is of little benefit since it does not allow trainees to develop any understanding of how to handle and use detection instruments or how to interpret the readings they provide. In contrast, the use of simulation equipment has recently provided a much-needed upgrade to CBRN response training and is currently enabling the delivery of a highly efficient, flexible and cost-effective service.

Another advantage is that simulant detectors like those in the Argon Electronics range can be used in isolation or as simulation probes for use with real

detection equipment they offer time and cost savings over traditional simulants or even the real detectors by avoiding excessive warm-up times. Electronic simulants are easier to control and are not capable of misuse in the same way as liquid simulants. Traditional simulants can saturate the training area and cause false positives, whereas electronic simulants have no environmental impact and can be used in public places. They can also be placed in a wider variety of locations, such as within vehicles or properties.

Crucially, simulators offer great flexibility in planning exercises. Instructors can prepare a scenario where the trainees do not know what they will encounter, which is extremely useful because in a real life situation the firefighters who are responding to an alert do not always know exactly what they are looking for. For example, the Argon Electronics LCD3.2e-SIM responds to electronic simulation sources that represent chemical vapours, toxic industrial substances or false positives.

Instructors can now manage the detection instrument training of multiple personnel, selecting the parameters for the activation of simulation instruments using PlumeSIM, a CBRN / HazMat

Images courtesy of Argon Electronics

data. All data is recorded and can be analysed after the field exercise using the after-action exercise review mode; all player movement and simulator activity can be reviewed by instructors and trainees at debriefing, providing individual trainees with detailed feedback on their performance, maximising the potential for the students to learn from their experiences.

During both the planning and review modes, the system can also be run in accelerated and paused time to firstly evaluate the validity of the scenario design, and then optimise the replayed exercise appraisal within a compressed time period. A pause can sometimes be extremely valuable in allowing instructors to evaluate, test or validate a student's progress and perhaps recommend changes in approach to ensure all participants get the very best out of the exercise.

In addition to its flexibility and ease-of-use, the system is also cost-effective for the end-users, since the number of simulation tools used can be expanded as and when budgets permit, and, because all simulators can be used independently, there is no redundancy of equipment. It is also possible for existing users of older Argon simulation detection instruments to upgrade their equipment.

Simulators and associated software are meeting the need for response training that prepares trainees for an unknown, unpredictable threat. Moreover, the capability of simulation equipment to play a vital role in improving the quality and consistency of training can only become more vital as budgets are tightened and governments seek the most efficient and effective options.

The use of such innovative training equipment has changed the face of CBRN / HazMat response training. These tools offer the ability to rapidly design multiple scenario options including the type of threat, the point of release or delivery mechanism from single or multiple sources, and a full range of constant or changing environmental conditions. With simulators now available that replicate some of the most widely used detection equipment globally, simulation exercises allow safe and cost-effective delivery of innovative training solutions for the current and the next generation of CBRN / HazMat response personnel.

Exercises using simulation instruments have enabled some specific problems to be identified and addressed long before a real life emergency. These have included problems of reading detection instrument displays accurately in bright sunlight, the difficulty of clearly communicating readings back to a command and control centre while wearing protective clothing, and the confusion that can arise if several personnel are using different detectors, each of which has been calibrated to output readings using different measurement scales.

Modern training simulation systems now play a key role in helping the emergency services improve response times, the safety of their personnel and the public, and their ability to combat a wide and varied range of CBRN incidents. Despite these economically challenging times, it is clear that governments worldwide are placing a high degree of importance on CBRN training. Simulation equipment enables first responder organisations to ensure that personnel are adequately trained to deal effectively with CBRN threats.



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Petroleum Storage Tank Facilities – Part 3

In previous installments of this series we talked about the types of petroleum storage tanks, their locations, common fire hazards, described the types of fires, and fire suppression systems that storage tanks may have.



Craig H. Shelley
FIFireE, CFPS, Retired Chief

Craig is a 45-year veteran of the fire service. He served with the FDNY for 26 years retiring as the Chief of Marine Operations. Currently, Craig is an Assistant Chief with Industrial Emergency Services (IES) and Manager of Marine Operations. In addition, he is the CEO of World Safe International.



Sue Tarantino
BS, MBA, Retired Battalion Chief

Sue is a retired 27-year veteran of the Charlotte (NC) Fire Department. She is currently a Division Chief with Industrial Emergency Services (IES) and Assistant Manager of Marine Operations. She also serves as a senior fire protection specialist with World Safe International.

In this third and final article we will discuss firefighting strategies and tactics as well as pre-incident response planning basics.

Firefighting Strategies and Tactics

Firefighting strategies and tactics begins with a well planned and tested pre-incident response plan. This will be discussed later in the article. Storage tank fires are complex events. These fires will require the implementation of plans, preparation, proper utilization of resources, and an extensive logistics section to ensure the resources are available and arrive on scene in a coordinated and timely fashion. The following strategies and tactics for firefighting presume that the planning and preparation stages have been performed by plant and fire department personnel. Experience tells us that successful and safe extinguishment of tank fires can only be achieved when based on planning and preparation, with all associated participating in all aspects of the process as well as the exercising of the plan. Exercising the plan can be conducted with table top scenarios as well as periodic full scale exercises.

As soon as a fire department receives notification of an incident, size up and intelligence gathering should be started. Information should be gathered quickly to begin the development of firefighting strategies. The following should be considered:

- Rescue of personnel in the immediate area
- Life safety hazards to site personnel
- Extension
- Confinement
- Extinguishment
- Environmental impact
- Community impact

After the immediate issues are addressed, we need to identify the type of fire present:

- Vent fire
- Seal fire
- Piping-connection fire
- Full surface involvement fire
- Overfill fire
- Tank and dike (bund) fire
- Multiple tank fires
- Exposures

Once we have examined the above information we can then begin to develop our resource list and incident action plan (IAP). Remember that the type of product involved will also impact our resource needs and tactics. The following are various types of fires and firefighting tactics:

■ Ground Spill or Dike Fires

These fires can be viewed as simple pool or spill fires. Calculate the area (length x width) and use the correct application rate based on NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*. Knowing the product will also give you the correct type of foam concentrate and application method. Alcohol products will require a gentle application method. Firefighters should not enter the dike area unless safe to do so and approved by the Incident Commander in consultation with the incident's Safety Officer. Atmospheric testing should be conducted prior to and during entry. Exposures such as tanks, associated piping, and pumps should be protected with water via ground or fixed monitors. Ground fires should be extinguished first, then using dry-chemical equipment, valves and flanges extinguished. The most effective equipment for these combined fires



Images courtesy of Craig H. Shelley

▲ Foam wand being placed during training.
Note the protective hose stream in place.

would be hydro-chem™ technology whereby foam/water solution as well as dry-chemical can be delivered simultaneously through the same nozzle.

■ Rim Seal Fires

Rim seal fires can usually be extinguished using the fixed or semi-fixed foam systems if installed and properly maintained. On external floating roof tanks, if the fixed or semi-fixed fire protection systems are not present, manual firefighting will need to be performed. Under the protection of a water spray, a firefighting crew will ascend to the gauging platform with hand-held foam equipment. The primary method should be the use of foam wands to capture the fire (Photo 1 – Foam Wand) which allows the placement of specialized monitors to be placed on the lip of the tank. (Photo 2- Specialized portable monitor) The monitors can then be used to extinguish the rim seal fire using the reach of the monitor

so that hoselines and personnel are not operating from the wind girder away from the ladder. If this equipment is not available, then foam hoselines could be used from the wind girder. This is a hazardous operation, and only undertaken if there is a structurally safe wind girder with handrails. (Photo 3 – Foam chamber and Wind Girder) Personnel should be secured to prevent falling.

In some instances, elevated streams from fire vehicles have been used. This is not a primary method of extinguishment. It has been noted that there is always a chance of sinking or tilting the roof under the excess water/foam solution, thus creating a larger problem, which may include an obstructed /unobstructed full surface fire.

On tanks fitted with internal floating roofs, these fires may be considered rare, but they do occur. They will be extremely difficult to extinguish unless fixed or semi-fixed fire protection systems are installed. Foam chambers and foam dams are the most effective, and the design of

the system should be calculated on a full surface fire, especially if the pan below is aluminum.

The most difficult method of extinguishment in a covered floating roof tank will be to shoot foam water solution through the eyebrow vents. Using hydro-chem™ into these vents has proven effective in the past.

■ Full Surface Fires

Staffing requirements for a major tank fire will vary depending on the type of tank, location, water supplies, nature of the incident and the availability of trained personnel. Attacks on these fires will predominantly use the Type III “Over the Top” method of extinguishing agent delivery. The product involved will determine the required foam application rate and percentage of concentrate to water flowed. The size of the tank will also determine the application rate. For larger tank diameters a larger application rate is required. The chart below is accepted by industry experts to be the *minimum* application rates based on the tank diameter:



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▲ Specialized portable monitor placed on lip of storage tank.

► Foam chamber on tank. Note the wind girder with appropriate handrail. If the foam chamber was not present or did not function properly, the wind girder could be used to advance foam hoselines for seal fire extinguishment.



Images courtesy of Craig H. Shelley

Table 1– Application rates

- Foam solution (foam concentrate + water) flow rates to be established are based on the following formula:
- Foam solution flow rate = Tank surface area x application rate (as noted in table 1)
- Tank surface area = $3.14 \times \text{radius}^2$
- Application rate = as per table below

Tank Diameter	Application Rate
Up to 45.72 m (150 ft)	0.61 lpm/m ² (0.16 gpm/ft ²)
45.72 m (150 ft) to 61 m (200 ft)	0.68 lpm/m ² (0.18 gpm/ft ²)
61 m (200 ft) to 76.2 m (250 ft)	0.76 lpm/m ² (0.20 gpm/ft ²)
76.2 m (250 ft) to 91.44 m (300 ft)	0.83 lpm/m ² (0.22 gpm/ft ²)
Above 91.44 m (300 ft)	0.91 lpm/m ² (0.24 gpm/ft ²) or greater

Foam Concentration Flow Rate (lpm [gpm] of foam concentrate)

- Foam concentrate flow rate = Foam solution flow rate x foam %
- Foam % = 1%, 3%, 6% depending on type of foam, product on fire and manufacturer's recommendations

Foam Concentrate Quantities

- Foam concentrate flow rate (lpm or gpm) x duration
- Duration = 65 minutes for Type III (over the top) applications

Please note that these quantities are for extinguishment purposes. For vapor suppression after extinguishment it is an accepted practice to double our extinguishment supplies to maintain the suppression of vapors and prevent the possible reignition of the product.

Some of the above flows may be well in excess of 37,854 lpm (10,000 gpm) and will require large capacity delivery devices such as large trailer mounted monitors and large portable pumps.

Now that we know our flow rates and foam concentrates required we need to also look at other factors such as:

- Position and condition of roof drains
- Volume of the product
- Status of tanks and valves
- Depth of water bottoms
- Structural condition of tank
- Product in tank and its physical properties
- Is there room in the tank to accept the total foam solution without causing an overflow
- What other tanks, piping, or structures may be exposed
- Wind direction
- Weather conditions (present and expected)

In any fire situation we want to involve the local facility personnel in our planning section as technical specialists. They may also be at the command post advising the Incident Commander directly.

These fires are not our ordinary 'bread and butter' operations and should be treated as an incident that can change rapidly and unexpectedly, often with severe consequences. Do not attempt to extinguish a full surface fire without all necessary resources on the scene. Cooling of adjacent tanks would be a tactic to be used prior to all foam delivery and personnel resources are on the scene. The cooling of the tank that is on fire is not recommended unless complete 360 degree cooling can be accomplished, which is rare. Also, when cooling a tank, use only the amount of water necessary. When the cooling water stops turning to steam, you may shut down the streams and start them up again when necessary. This will conserve water supplies for extinguishment and reduce the water flowing into the dike areas. Generally between 1,893 lpm (500 gpm) and 3,785 lpm (1,000 gpm) will be required for each tank cooled. In addition to the proper delivery devices and foam supplies, we need to be sure that our foam solution delivery zone on the surface will be able to spread out once it hits the surface and cover the complete surface area. According to the National Fire Protection Association (NFPA) foam can travel effectively across at least 30m (100 ft) of burning liquid. We believe that for calculating foam runs, this number should be reduced to 24m (80 ft), ensuring that our landing zones travel and overlap each other. Firefighters should be aware of the distance a master stream can reach as well as the landing zone length and width. These can be obtained from the manufacturer of the monitors and nozzles and verified in the field during drills and exercises. By knowing this information we can pre-plan the positioning of our master streams. Range finders can be used during operations to gauge distances to the tank to assist with monitor positioning. There are a few occurrences that can happen at a storage tank fire that the fire service should be aware of. These are:

■ Slopover

This event can happen when a water stream is applied to the hot surface of burning oil, provided that the oil is viscous and the temperature exceeds the boiling point of water. It causes a short duration of slopping of froth over the rim of the tank with a minimum of intensity.

■ Frothover

Frothover is a steady, slow moving froth over the rim of a tank without a sudden and violent reaction. Frothover may occur when the tank is not on fire and water already inside the tank comes in contact with hot viscous oil which is being loaded. An example is when hot asphalt is loaded into a tank car and comes into contact with water in the tank, causing the product to froth over the top. During a fire with crude oil it may also happen when the heat wave created by the burning crude oil reaches the water layers (stratums) in the crude oil. This heat wave will convert the water to steam, causing a frothover.

■ Boilover

This event is a sudden and violent ejection of crude oil from the tank due to the reaction of the hot-layer and the accumulation of water at the bottom of the tank. The light fractions of crude oil burn off, producing a heat wave in the residue. The residues with their associated heat wave sink towards the bottom of the tank. This heat wave will eventually reach the water that normally accumulates at the bottom of the tank, and when the two meet the water is superheated and subsequently boils, expanding explosively causing a violent ejection of the tank contents and fire. The expanding contents being expelled can travel the distance equivalent of ten tank diameters. Careful consideration should be given during pre-incident response planning of the location of the command post, staging areas, rehab, equipment placement, etc.

Pre-Incident Response Planning

When planning for a response to a petroleum storage tank facility it is best that the information gathered is done on-site and with the assistance of facility personnel. While on site, access roads that you may use to access the area and position fire apparatus (appliances) should be driven by the vehicles that will be used during an incident. Many times the turning radius of apparatus is too great to make the turns needed in the facility. Swales or culverts may also impede apparatus. If the apparatus chassis is too long and or low, it may hang up or ground while traversing a

swale or culvert. Bridges on site may not allow the weight limit of new apparatus, preventing its use at an incident.

During pre-incident response planning information that should be gathered includes the following:

- Tank types, dimensions, contents and capacities
- Pipe isolation valves, locations, and operating mechanism
- Fixed fire protection systems available
- Access points to facility and tank
- Contact phone numbers
- Locations and operation of emergency shutdown devices (ESD's)
- Availability of firefighting resources
- Water supplies
- Pumping requirements
- Foam concentrate requirements
- Mutual/automatic aid available

Other information can be obtained based on the needs and requirements of your department. While these articles are not totally inclusive of all information that a fire department needs to know, it is a good start. Other resources are listed at the end of this article. It is important that firefighters attend classes on this specialized firefighting, pre-plan these facilities, and exercise the pre-plans. Don't allow these facilities to become part of the landscape. Visit these facilities and ask questions!

 **For more information, go to**
www.worldsafeinternational.com

Resources

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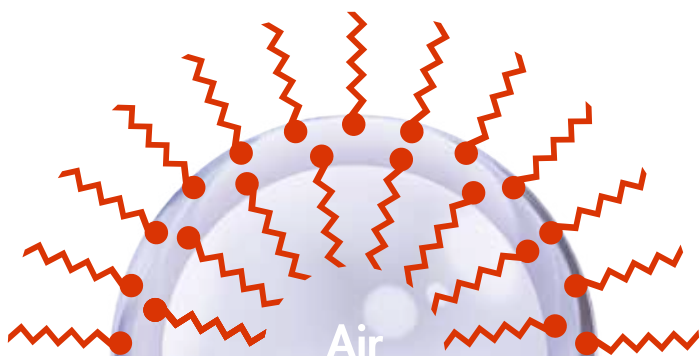
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Fatal Attraction



Fluorine-free foam bubble

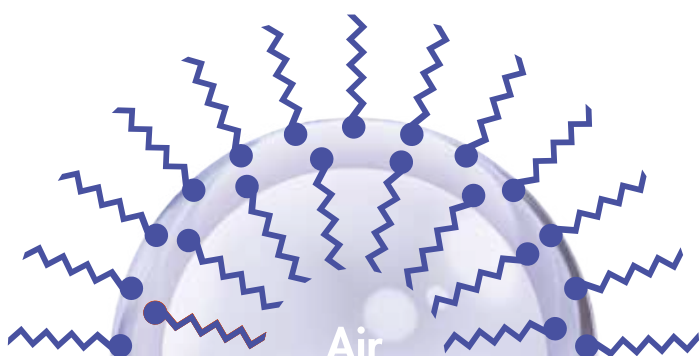
F3 Foam **attracts** hydrocarbon fuels

 **Hydrocarbon surfactant**
(Hydrocarbon tails are fuel-loving)

FORCEFUL F3 APPLICATION:

- Foam attracts fuel
- Foam becomes flammable
- Foam has reduced performance
- Foam use is increased

Need proof? See F3 foams on fire:



Fluorinated foam bubble

AFFF Foam **repels** hydrocarbon fuels

 **Fluorosurfactant**
(Fluorocarbon tails are fuel-hating)

FORCEFUL AFFF APPLICATION:

- Foam repels fuel
- Foam is NOT flammable
- Foam has superior performance
- Foam use is reduced

One year ahead of the US EPA 2010 / 2015 PFOA Stewardship Program deadline, Dynax only manufactures high purity C6 Fluorosurfactants, Foam Stabilizers and optimized High Performance Blends meeting the toughest fire performance specifications (including Mil F) at traditional / reduced Fluorine Levels.

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What Happened to the Air? Hidden Dangers Aboard Ships

Aboard ship there are many areas that have hidden dangers of which the land-based firefighter may be unaware. I think that we all would be suspicious about entering a newly emptied cargo tank aboard an eight hundred foot gasoline tanker. We all know the problems with flammable gasses given off by flammable and combustible liquids.



Tom Guldner

Tom is a retired Lieutenant of the New York City Fire Department's Marine Division and is a Principal Member of the NFPA Technical Committee on Merchant Vessels. His company Marine Firefighting Inc. is involved in consulting and training mariners and land based firefighters in all aspects of marine fire fighting.

However, would you also be concerned about entering the chain locker in the bow of this same vessel where only the anchor chain is stored? After all, what kind of a danger could all that nonflammable chain present?

What happens to the outside of the metal chain as it sits in the damp chain locker? The metal will start rusting. We all remember from our "Handbook of Fire Protection" that rusting is a form of oxidation. And oxidation consumes oxygen. The oxygen acts with the wet iron or steel and a pyrolysis reaction takes place. This "slow burning" gives

off some heat but most of that is dissipated by the metals mass and the surrounding atmosphere. Later we will discuss cargos aboard which will not allow that heat to be dissipated so readily.

Our problem arises in the fact that this oxidation is using up the available oxygen that we need to survive. If the compartment in question has no inlet or outlet to allow a circulation of fresh air, we may have an oxygen deficient atmosphere.

Normal air contains twenty one percent (21%) oxygen. As this level is decreased, the danger to anyone entering that space increases. It becomes a hazard when the level drops below 19.5%.



Image courtesy of Tom Guldner



The progression is as follows:

19.5%	Minimum acceptable oxygen level.
15-19%	Respiration increases. Poor judgment.
12-14%	Decreased ability to work strenuously. Impair coordination.
10-12%	Respiration increases. Lips blue
8-10%	Mental failure. Fainting. Nausea. Unconsciousness. Vomiting.
6-8%	8 minutes – fatal, 6 minutes – 50% fatal, 4-5 minutes – possible recovery.
4-6%	Coma in 40 seconds. Death

A response to a ship fire or emergency should mandate the inclusion of oxygen meters as well as gas meters in your tool list. Any area aboard ship that is not normally occupied or entered should be considered suspicious.

Most vessels are made of steel. All of these metal surfaces are subject to the oxidation of rusting that we previously discussed. Just ask the ships deck hands who are constantly kept busy chipping the paint at the rusted areas. (US Navy photo above)

Air samples must be taken at all levels of the compartment prior to entry. If you do not have the proper sampling equipment ask a ships officer if they have these meters.

Generally all ships, but especially tankers, will have these meters on board. When at sea, older tankers clean their tanks and then members of the crew will enter for mucking out (that's as messy as it sounds) and general maintenance. Before they are allowed to enter, the atmosphere is suppose to be checked. Regardless of whether these meters are available or not, **ONLY QUALIFIED, CONFINED SPACE CERTIFIED** personnel should ever enter any space considered a confined space. If you are in doubt as to whether an area is a confined space then "IT IS A CONFINED SPACE!"

Examples of Confined Spaces:
(Items in red may be aboard ships)

Tanks	Manholes
Boilers	Furnaces
Sewers	Silos
Hoppers	Vaults
Pipes	Trenches
Tunnels	Ducts
Bins	Pits

Potential Hazards in shipboard Confined Spaces

■ **Oxygen Deficiency**
<19.5% or >23.5% oxygen concentration

■ Combustibles	
Methane	Hydrogen
Acetylene	Propane
Gasoline fumes	Toxic Materials
Carbon Monoxide	Hydrogen Sulfide
Welding fumes	Corrosives

■ **Electricity**

■ Mechanical Hazards	
Machinery	Conveyers

There may be another naturally occurring area where you may encounter a low oxygen level. Some cargo will also eat up the oxygen within the cargo hold. Most organic cargos will undergo a ripening or a decomposition process while being transported. This can actually be considered a form of combustion and enough heat may be produced to cause ignition. We are more familiar with this when it is called spontaneous combustion.

A good example of this is wood pulp.

This product is often carried on large barges and aboard Dry Bulk Carriers. The wood pulp will start to degrade in the presence of oxygen. In the process oxygen is consumed and if adequate ventilation is not provided the oxygen level may be reduced to dangerous levels. As mentioned, in this oxidation process heat will be produced and if confined with inadequate ventilation it may spontaneously ignite causing a deep-seated fire which may be extremely difficult to uncover for extinguishment.

In many cases the entire cargo must be unloaded in order to access the burning material. If the vessel is underway it may have to proceed to an unloading facility for extinguishment.

Many cargos may react in this same manner. Coal (see photo below) can be one of the most troublesome fires to extinguish. Wet coal will heat causing pockets of smoldering coal which is one of the cargos which may have to be unloaded for final extinguishment.

Produce will ripen during shipment causing the same heat and oxygen consumption. The owners of the fruits and vegetables are not very happy about this and in my next article we will discuss some of the ways they are able to slow the ripening process which will also dramatically effect the air problems your Firefighters will encounter.

To sum up, you should not trust any areas aboard ship where crew members do not regularly work. Even if there are no hazardous chemicals in use, the oxygen levels may be reduced to dangerous levels. When in doubt, test the atmosphere. If the fire situation requires it then full PPE and positive pressure masks should be worn (with the facepiece ON!)

Any area aboard which meets the criteria for a Confined Space should not be entered by anyone but Confined Space trained personnel. And if you are in doubt as to if the area is a confined then IT IS A CONFINED SPACE!

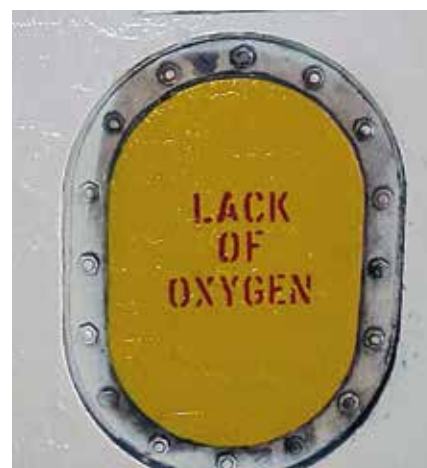
My seminars discuss all of the dangers which can be encountered aboard a ship. Gas inerting, Oxygen Deficient Atmospheres (in addition to the one discussed here), explosive atmospheres, entrapment dangers, electrical dangers (440 – 880v), and the list goes on. Placing your structurally trained firefighters into the marine environment without proper indoctrination and training is not only unsafe, it can also be legally devastating to your department or municipality.

The following is a quote from the National Fire Protection Associations Handbook of Fire Protection Chapter 15-1.2 of NFPA standard # 1405 dealing with volunteer, career, as well as mutual aid fire departments who have been defendants in law suits involving losses at ship fires, states:

"An understanding of the dangers inherent in marine fire fighting should include an understanding of the consequences of the failure to provide a standard of training, planning, response, and action equivalent to that which a department provides on the land-based portions of its response area."

This just in...

While I was writing this article, dealing with lack of air in many areas aboard ship, mariners were tragically killed in actual incidents which was warned about here. The following is from the Trade Winds web-site.



▲ A response to a ship fire or emergency should mandate the inclusion of oxygen meters as well as gas meters in your tool list. Any area aboard ship that is not normally occupied or entered should be considered suspicious. Remember, not all oxygen deficient areas will be as well marked as the one pictured above.

UK authorities are investigating the death last month of two seafarers on a Carisbrooke Shipping general cargo vessel. The 13,400-dwt Sally Ann C (built 2007)

The chief officer and the chief engineer collapsed in a cargo hold of the 13,400-dwt Sally Ann C (built 2007) on 13 March.

The ship's second officer is said to have tried to help his two colleagues, but lost consciousness and had to be revived.

The Isle of Man-flagged vessel was off the coast of Senegal bound for Dakar carrying a cargo of timber when the incident occurred.

Additionally, three men died on the Surtis by entering one of its holds that was identified as "dangerous" and not to be entered without a permit and the hold being ventilated first.

At the bottom of the ladder leading into the hold, oxygen levels as low as 5% were found. "Such low levels cannot support life," the MAIB said.

The full story can be found online at; <http://www.tradewindsnews.com/casualties/357420/cargo-hold-claims-two>

Don't send your Firefighters into an environment that they are not trained to handle! Until next time, stay safe.



For more information, go to www.marinefirefighting.com



Leading in secure and rapidly deployable communications

Excelerate is a global market leader in the provision of data, video, voice and Internet via satellite and wireless solutions. As pioneers of the concept of satellite broadband on-board emergency response vehicles, Excelerate now provides independent, private and secure mission critical communications solutions to fire fighters and emergency responders across the globe.

Through innovative and seamless integration, our communications solutions enable emergency responders the ease, freedom and security to rapidly deploy resilient and reliable communications anytime, anywhere.

We have invested heavily in our satellite service provision and offer a choice of satellite systems and bandwidth packages to suit customers' requirements.

Our unique Enhanced Resilience Satellite Network (ERSN) is a ground breaking,

fully managed service that is the first to be accredited with the ISO: 27001 certification, an internationally recognised standard for security compliance.

With expanding operations throughout Europe, the Middle East and Australasia, our team are trusted to deliver world class, mission critical communications to emergency responders, as well as to government, maritime, security, transport, national infrastructure and utilities sectors across the globe.

Integrated communications technology solutions

Excelerate's integrated solutions provide users with access to a resilient communications infrastructure – supporting data, video and voice applications whenever and wherever required. Whether integrated on board rapid response vehicles, command & control vehicles or into rugged portable systems, our solutions are customised to users' needs whilst ensuring they are supported with the most efficient, simple to operate systems.

DDMI user interface: Bringing simplicity & clarity to complex operational environments

Our Digital Dashboard Management Interface (DDMI) combines all communications systems and solutions, including physiological monitoring, into one seamless operating interface allowing personnel to control, monitor and analyse every aspect of an incident from one place. DDMI simplifies complicated technologies, reducing the requirement for human intervention and allowing our customers to focus on their primary duty as emergency responders.

UK – More command & control vehicles equipped by Excelerate

In the UK, the majority of Fire & Rescue Services utilise command & control vehicles equipped by Excelerate. This includes West Midlands, Northumberland, Humberside and Scottish Fire & Rescue Services, encompassing a wide diversity of terrains and geographies, across urban and metropolitan areas to predominantly rural areas, where terrestrial networks might not exist, are unreliable or need extra resilience. Excelerate's trusted communications solutions are providing Fire & Rescue teams across the UK with a detailed common operational picture and unparalleled situational awareness throughout an incident ground.

Australia – Resilient communications for Victoria Country Fire Authority (CFA)

Victoria CFA's mobile command fleet, including two large incident command vehicles and seven smaller field operative vehicles are all fully integrated with Excelerate's suite of command and control solutions.

The command vehicles were a direct response to the lack of communications resilience experienced by the emergency services during the bushfires of Black Saturday that swept across the state in February 2009.

▼ West Midlands Fire and Rescue Service Incident Command Unit.





▲ Gibraltar multi-agency command support unit (top). Reflex – vehicle mounted communications pod (above). Victoria CFA command fleet (above right).

Craig Brownlie, Manager – Structural Planning with CFA spoke on how Excelerate Technology's solutions had already made a difference in the field:

"We have taken the vehicle out on a number of occasions for field-testing. It's done very well. We have been using the video facility such as the mast camera and the deployable cameras. We have also had the body-worn cameras out for field- testing, live video feeds back into the vehicle from 1.8 km, which is phenomenal."

Excelerate have people onsite and available in Australia 24/7, providing exceptional support for the commissioning of these vehicles. There has been support provided throughout the whole process, which has been fantastic."

Europe – Driving multi-agency collaboration

As the landscape of emergency management changes and interoperability and the sharing of information becomes increasingly more crucial, more blue light services are choosing Excelerate to deliver their mission critical communications solutions.

Royal Gibraltar Police plan on sharing their resources across a wide spectrum of applications inclusive of both Fire and Ambulance services.

"Excelerate held our hand through the process and helped guide us through getting the right solution for the needs of our Police, Fire & Ambulance service."

We have established a very good relationship with Excelerate and I look forward to partnering with them again in the future."

Albert Rocca, IT Operations Manager, Royal Gibraltar Police.

Deployable data networks

Where responders require resilient, independent communications networks within an incident ground, Excelerate's RapidNet LTE (4G) communications bubble supports data and voice communications as well as fast internet access for smartphones, tablets, laptops and other mobile devices. RapidNet LTE can be integrated into a vehicle or a portable system and along with a resilient satellite backhaul, provides an 'all in one' communications solution.

Vehicle mounted communications pod – 'Reflex'

Ideal for instant communications on-board rapid response vehicles, Reflex allows personnel to access and share information in real time when first at the scene.

The roof mounted communications pod includes our KA rapidly deployable satellite platform, 3/4G failover connections, integrated emergency lights, scene lights and 360 degree camera recording. All of this technology is housed within the pod freeing up space inside the vehicle for equipment and/or personnel. Reflex is universally adaptable and can be transferred to another vehicle's roof rack as required.

Portable communications pod

With all of the functionality of our vehicle-mounted pod (Reflex), the portable communications pod can be deployed in areas where vehicle access is difficult, e.g. in flood zones or swift water rescues.

In the form of a ruggedized wheeled case, the portable communications pod can be quickly deployed by a single person to support critical communications at incidents. It features a satellite backhaul connection for use when terrestrial networks are unavailable.

Camera solutions

Our camera solutions allow teams to extend video coverage at incidents or undertake surveillance of wide areas supporting real time situational awareness.

Solutions include body-worn, deployable tripod mounted cameras, Sherpa (our innovative pole climbing camera) and mast-mounted cameras. These can incorporate RapidNet COFDM technology, which improves video transmission over difficult terrains, such as in tunnels and within buildings, providing significant performance advantages over other connection options. New upgraded features of our body-worn cameras include infra-red, waterproofing and more.

We also offer an easy to use unmanned aerial vehicle (UAV) solution, providing an instant 360 degree aerial view where required. Image stills or video can be broadcast back to a compatible device up to 2km.



For further information please visit
www.excelerate-group.com

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Coming out of the Dark Ages with LED Vehicle Lighting

Warning lights on emergency services vehicles provide an essential safety function by warning road users of a hazard ahead, along with the need to move out of the way giving priority to the emergency vehicle, allowing for a safe and rapid response to an incident. Sadly however, for some the fitting of warning lights is seen as just another expense, and in the current climate the temptation can be to buy the cheapest available product that “ticks the box”.



Peter Cook

Such a short sighted approach however can jeopardise safety and result in the fitting of poor performance, unreliable, high maintenance products, resulting in a much higher lifetime cost than might first appear.

The primary consideration for a light bar, directional warning light or beacon should be the choice of light source. Whilst halogen lamps are inexpensive, they do have a limited life of around 2000 hours, which can equate to only a few months life in applications where warning lights operate for long periods. This can cause significant disruption especially when mounted on high vehicles. Furthermore the limited light output of Halogen light sources commonly necessitates the use of rotator assemblies to direct the light source, adding further to the maintenance implications as well as being an additional noise source located within operator hearing range. On top of this, the combination of halogen lamp and rotator assembly results in significant power consumption which can be a major concern if vehicles are stationary without the engine running.

An alternative is to use a strobe light source, strobes are much more powerful

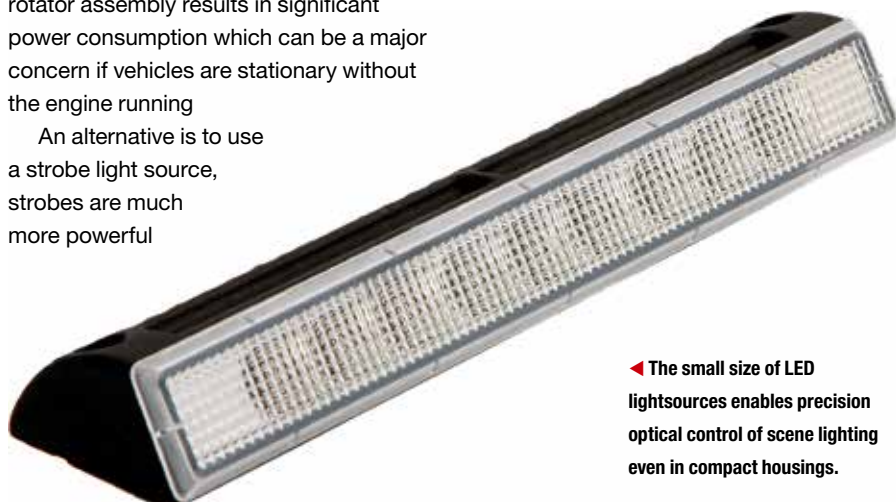
than halogen sources, avoiding the need for a rotating assembly, reducing maintenance requirements and noise. Again though, light source life is limited and strobe technology is also power hungry.

The final and increasingly popular alternative is to use LED technology. LED's can be used to produce light in a range of different colours including white and blue and red.

The crucial benefit of LED technology is working life, latest generation LED technology offers a life of typically 50,000 hours – many times that of a halogen source, allowing maintenance intervals of many years instead of a few months.

LED's can be switched on and off at high speed without affecting life, allowing silent operation with a choice of flash patterns.

When considering LED technology, care needs to be taken to ensure that quality products are chosen. Previous generation LED's offer a much shorter life



◀ The small size of LED light sources enables precision optical control of scene lighting even in compact housings.

Peter Cook is the Sales and Marketing Director for Haztec International Limited

► Modern LED warning lights can be as thin as 10mm whilst still passing EC65 Certification



than current generation versions (typically less than half of a good quality current generation product.)

Current generation LEDs can produce many times more light than older generation products and can have a considerably longer life.

However, both light output and LED life are very much dependant on the quality of drive circuitry and the thermal management of the LED chips.

Warning lights are often used in hot environments and in particular can be exposed to sunlight for long periods. To ensure a long and trouble free life, quality of design is essential.

A good way to evaluate the quality of an LED product is to consider the length of warranty offered. Haztec for example offer product warranties of up to 5 years – demonstrating complete confidence in product design and component selection.

The compact nature of LED lights means they can be much less obtrusive than previously possible, Directional warning lights are now available with depths of as little as 10mm so lights no longer require semi recess or recess mounting in order to avoid bulky protrusions.

EC65 approval

EC65 is a European third party approval process that is designed to ensure that visual warning devices are fit for purpose. To gain approval, products are tested by a certified independent test house to verify that the light output is within tightly controlled maximum and minimum limits over a wide range of viewing angles. The standard also verifies that flash frequencies are correct.

In addition, EC65 also includes demanding environmental tests to ensure adequate ingress protection along with tests to ensure that the light output falls in the correct part of the colour spectrum.

EC65 approval is mandatory in the majority of European countries and is highly recommended in the rest. Outside of Europe other standards may be required or potentially none at all. In the absence of a required standard, EC65 approval can be specified with confidence knowing that the resulting product will be well designed and fit for purpose.

Multi colour technology

Another advantage of LED technology over halogen and strobe alternatives is that it generates coloured light rather than generating a white light and relying on coloured lenses to produce the desired final light colour.

With LED technology the required light colour can be generated from the outset, enabling clear lenses to be used.

Colour change LED technology has been around for some time particularly in the entertainment and architectural lighting sectors. This technology typically uses multiple different colour LEDs – typically red, green and blue all mounted together on a single tiny chip. By controlling the relative power output of each individual colour it is possible to “mix” the colours in differing proportions and produce a simulation of any colour in the spectrum.

Whilst ideally suited for many applications, this technique has not generally been suitable for emergency warning lighting use. These multicolour chips are not generally able to produce sufficient light intensity for effective warning.

However LED technology has moved on and some specialist LED chip manufacturers now produce high power LEDs with 2 separate on board chips allowing 2 dedicated colours to be produced. These chips allow one or the other colour to operate at full power producing a suitably intense output of a fixed light colour – effectively 2 different LEDs but importantly sharing a common optic and maintaining sufficient light intensity for effective warning.

As an example of this technology, Haztec recently developed the XED module range, these modules have dual colour output and have been independently certified to EC65 class 2 (the most demanding level of performance within EC65) in both blue and amber. This allows a single lightbar to be set to operate with either a blue or amber light output which can be

▼ Latest LED modules can offer dual colour output without compromising on intensity.



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◀ LED technology allows Lightbars to be much lower profile whilst still having room for Auxilliary equipment such as siren speakers.

changed at any time using a single button on the dashboard. Whichever colour mode is selected the entire lightbar operates at the desired colour.

Other applications for multi colour technology include having lights change colour depending on circumstances, for example on a lightbar, when the vehicle is travelling all lights can flash say blue for maximum warning impact, but when the vehicle reaches the incident, some lights can change colour and flash red.

Beyond warning lights

Scene light applications that demand high light levels previously required the use of large halogen light sources or

discharge lights, neither of which are ideal for vehicle based applications.

Halogen lights are power hungry, relatively inefficient and have a relatively short working life.

Discharge lighting is much more efficient but can suffer from long warm up times and difficulty with efficient optical control.

Good quality LED's are more efficient than halogen producing more light whilst consuming less power. In addition LED's operate over a wide temperature range and illuminate instantly – even in very low ambient temperatures. These benefits, coupled with long life and rugged design is increasingly making LED technology

the preferred choice for vehicle interior lighting and scene lighting as well.

Over recent years advances in thermal management have allowed the use of high power LEDs giving very high light outputs, LED scene lighting can now provide lighting levels that could previously only be achieved with discharge lighting.

Providing the Light is well designed with stable LED temperatures, LED lighting can offer a very efficient compact long life reliable light source.

Another major benefit of LED lighting is that the LED is a very small light source with a very directional light output. This makes it comparatively easy to control and direct the light output. Lights can be designed to have short range, wide angle beams, long range focussed beams or even combination beams offering both wide angle and long range components.

Scene lights mounted on the sides of vehicles can have very precise optical control directing light downward and outwards covering the area immediately surrounding the vehicle but without causing glare or wasting valuable light.

Summary

LED technology is being increasingly used in numerous different applications on modern vehicles, this is being driven by the combination of long life, silent operation, low power consumption and slimline design.


Whilst it is true that LED technology has a higher initial cost, the long term maintenance and energy benefits of LED are making it an increasingly popular choice for many vehicle applications. Furthermore LED technology continues to evolve creating new possibilities for warning and scene lighting.



For more information, go to
www.haztec.uk



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The compact low footprint design allows for ease of storage when the fan is not required.

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The entire product range and detailed technical data can be found at **ruwu.de**

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What's New with PPV Equipment

With the greatly increased use of ventilation technology, the leading manufacturers have boosted their research and development efforts to provide the end user with the most efficient and reliable equipment. In this Buyer's Guide we highlight the latest offerings from the worlds leading suppliers.

Ruth Lee Fire Training Equipment

Ruth Lee Ltd, Europe's leading manufacturer of Rescue Training Manikins, has gone into partnership with its Dutch distributor, FireWare, to supply a new range of fire training equipment.

FireWare is now the Netherlands leading supplier of fire training equipment with a domestic market share of approximately 80% and is expanding its export distribution to the UK, Ireland, Germany, France and Denmark with Ruth Lee Ltd being the exclusive distributor for the UK and Ireland.

Sales and Marketing Manager, Stuart Cheetham said "The new partnership with FireWare is an exciting time for us here at Ruth Lee as it enables us to expand the range of products that we are able to offer our customers. At Ruth Lee we pride ourselves on the quality of the products that we manufacture and any products that we

distribute have to meet our own strict quality requirements; the FireWare products do just that."

The most popular product from the new range is the Mini PPV Trainer with a number of UK Fire and Rescue Services having already purchased. The Mini PPV Trainer features a built-in smoke machine and comes complete with a basement, 2 floors and an attic space as well as two fans. The whole unit comes supplied in a heavy duty flight case which doubles as a demonstration stand.

David Escudier, Operational and Development (Specialist Skills) Manager for Kent Fire and Rescue Service commented "The PPV trainers are proving fundamental in our service wide PPV awareness training and increasing our more offensive use of PPV".



 For further information, go to www.ruthlee.co.uk

Concept Engineering Limited

Artificial smoke is an essential training tool in PPV exercises or impulse ventilation testing (road tunnels etc.)

The majority of smoke systems in use today are derived from theatrical water based machines, and the resulting smoke evaporates rapidly in the fast moving airstreams that PPV and impulse systems create. Hence false impressions can be created as to the effectiveness of such systems.

Concept's ViCount and Vulcan smoke systems use an intrinsically biodegradable food quality chemical to produce a non-toxic smoke that is virtually unaffected by these high airflows (the resulting smoke travel can be measured in terms of kilometres in a confined tunnel environment) – hugely improving the effectiveness of training! Users will often find that just a single ViCount or Vulcan smoke generator will replace more than 10 theatrical water-based smoke systems and these units can pay for themselves in savings in running / maintenance costs within a matter of months

This smoke type is also extremely temperature resistant (to over 200°C, almost 400°F), so thermally buoyant smoke can be created in conjunction with a heat source.

If you'd like to see for yourself the impact of using a Concept smoke generator for PPV testing, hot fire training or indeed any large volume BA complex, just let us know! Concept has over 50 years' experience in manufacturing industrial smoke generators specifically designed for fire training.

 For further information, go to www.conceptsmoke.com



Dafo Brand AB

The Swefan 21" is the latest model of PPV fan to be manufactured by Swedish Company Dafo Brand AB. The new model fan is a result of numerous enquiries from Dafo Brand's customers asking for a high quality ventilation unit that could still perform to a high capacity but slightly smaller in size so that it could conveniently fit on fire trucks and other spaces. The result is a tremendously reliable unit. It has a direct drive and is powered by a Honda engine. The Swefan 21" runs with the minimum amount of vibration and remains stable on most surfaces, it can also be tilted into 5 different angles. Large wheels and a handle ensure easy transportation and manoeuvrability.

The Swefan 21" can also be fitted with various accessories which includes an exhaust hose, door adaptor as well as a hi-expansion foam adaptor "Skumrask" making the Swefan extremely versatile and more than just an air mover.

Visit us at Interschutz in Hall 13 on Stand F20.



For further information, go to
www.dafo.se



BIG-Tempest

BIG-Tempest is the worldwide leading manufacturer of customized Mobile Ventilation Units with a wide range of products and more than 150 units in service worldwide.

With the new MVU L125 II BIG-Tempest is setting the pace in large scale positive pressure ventilation. Equipped with a new reliable and economic Ford engine, reengineered shroud design and an overall improved operator interface the MVU L 125 II is taking PPV to the next level of ventilating large structures such as industrial manufacturing plants, airports, hospitals, commercial buildings or tunnels.

With a proven effective air flow of up to 1.000.000 m³ / 590.000 cfm the MVU L125 II is the most versatile ventilation unit for a wide range of applications. The integrated water mist system with a flow of 280 lpm / 73 gpm enables the user to cool down fires and objects, knock down gases and vapors or spray water to keep large crowds cool. An optional ventilation hose kit with non-collapsible ducts is available for an effective smoke extraction. The MVU L125 II can do more than just getting smoke out of a building.

With a MVU L125 II fire departments can pressurize a manufacturing plant or other large structures in case of a fire. This way they can prevent the building and operation from smoke damage. Down times in manufacturing are reduced and the costs of disruption is down to a minimum.

BIG is introducing a new model on Interschutz the MVU L105, compact, lightweight and powerful the L 105 is the latest innovation of nearly 20 years of experience in building large scale ventilators engineered and Made in Germany.

Visit our booth at Interschutz open air site N07/4.



For further information, go to
www.big-tempest.de

Ramfan Positive Pressure Ventilators

Euramco Safety Worldwide, designs, engineers and builds Ramfan ventilators for firefighting markets worldwide. Choose from a wide selection of gas, electric and water fans.

Ramfan PPV gas or electric fans are available in sizes from 16" to 21". Some agencies need a fan that's placed close to an opening such as row houses and apartments. The GF185 18" is a popular model for this application. But if you need a fan that can be setback from the opening, consider the GX gas-powered or the EX electric fans that come with PowerStream. This technology combines an integrated impeller and rigid stator vanes that focus the airstream. This allows fans to be set back 8' to 16' from an opening allowing easy ingress and egress. It also reduces noise inside the structure.

With the ongoing creation of warehouses, big box stores and high-rises, you need a much more powerful blower to clear large volumes of air. Ramfan makes fans for Large Structure Ventilation (LSV) because you can't remove smoke from a large fire with PPV fan. These 21" to 28" gas-powered units come equipped with the PowerStream air straighteners. The LSV blower is like a large diameter hose that delivers much more water than a standard diameter hose.

The top-of-the-line VX700 is a trailer-mounted unit that creates 60,250cfm. It's easily moved by two men over curbs, steps and

ramps, and can be quickly placed directly in front of an opening. What's more, it's affordable. Few departments can justify the huge monstrosities that are hard to move and pricey. You can get 6 of the VX700 units for the price of ONE of those monster fans. This means you can service a larger geographic area and you can distribute units to multiple incidents simultaneously.

Finally, if you need a fan for rescue operations in hazardous locations, check out the Ramfan explosion-proof line. They're intrinsically safe, fully ATEX certified fans that can be used in explosive environments. This keeps you free of the chain of liability should there be an accident.



For further information, go to
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Tempest

Since 1987, Tempest Technology Corporation has been a leader in the development of innovative ventilation tools for firefighting and industrial work environments. In the beginning, Tempest produced inflator fans for hot air balloonists and now manufactures a wide variety of ventilation tools used by firefighters around the world. This extensive line of equipment designed and built by Tempest all have one common objective; make hazardous environments safer.

Tempest offers a comprehensive line of gasoline, electric and hydraulic driven Power Blowers™ designed for a variety of emergency ventilation applications. Additionally, Tempest VentMaster™ Fire Rescue Saws and their Raptor Carbide Chains are used by thousands of fire departments worldwide for vertical ventilation operations. Tempest also manufactures the MVUTM, the most used mobile ventilation unit in the world with hundreds currently in service in countries such as the US, Japan, Switzerland, Germany, Indonesia and many more.

All Tempest product lines are distributed through a global network of dealers selected for their industry knowledge, professionalism and commitment to customer service. The Tempest dealer network includes the top equipment dealers, installers and apparatus manufacturers in each market we serve.

Tempest Technology team members are committed to providing our customers and end users with the highest level of service and support. We take tremendous pride in our products and the role they play in enhancing safety.



For more information, go to
www.tempest.us.com



VENTRY Solutions

VENTRY® Fans are inherently safe, very efficient, and versatile, with three adjustable legs for positive pressure attack and ventilation. They overcome common obstacles that handicap conventional blowers. Legs allow for quick placement wherever they are most effective, far back from the entry and out of the way of crew and victims. The fan and its airstream are lifted above obstacles (stairs, hills, snow...) and there is no shadowing of the air stream by the ground.

All the benefits of VENTRY Fans equate to safety, versatility and ease of use. They feature state-of-the-art Safety Propellers, pressure-bonded with Kevlar and fiberglass for proven safety. They deploy fast, with one person and no lifting required (see video of demo by pregnant woman on ventry.com). They are light weight, quiet, and low in emissions. Legs allow you to tilt, aim and stabilize with the turn of a knob. VENTRY Fans can be positioned for best performance, not as a reaction to the terrain or obstacles. GFCI-compatible three-phase electric models are available. The fans won't walk or rotate and they have vibration dampening feet with tough tread for aggressive grab on slick and slanted surfaces.

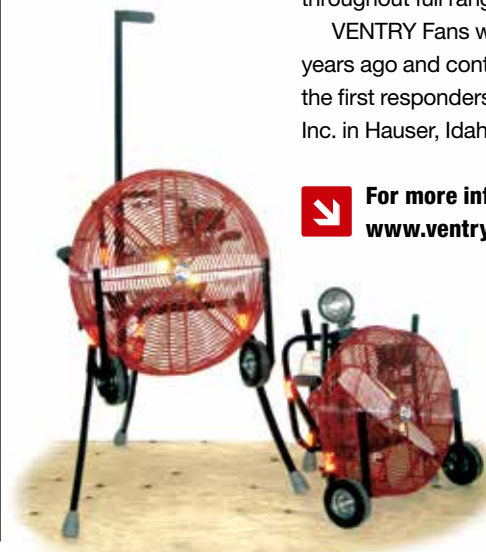
Options include Entry Point Lights (halogen and LEDs), Wheels and Skids, and more. All fans have side handles for easy 1- or 2-person carry. With 14-inches between propeller and ground, there is no intake of foreign matter so crew isn't blasted with sand and the fan won't plug with leaves. Robust, solid aluminum legs are guaranteed not to break or bend and provide a solid 3-point stance

throughout full range of leg extension.

VENTRY Fans were first made 26 years ago and continue to be made by the first responders of Ventry Solutions, Inc. in Hauser, Idaho, USA.



For more information, go to
www.ventry.com





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HAAGEN PPV Trainer

PPV is a powerful firefighting tactic when used correctly. With the HAAGEN Positive Pressure Ventilation (PPV) Trainer, it is now possible to conduct hands-on PPV training that is efficient and effective. The PPV Trainer allows you to challenge trainees to control doors, windows and roof vents on a number of floor plans to successfully ventilate a building.

HOW THE PPV TRAINER WORKS

Students can set-up fans, introduce smoke and control doors, windows and ventilation holes to learn the principles of PPV. Clear walls and red transparent doors allow students to visualize the air flow and learn to control ventilation.

MODULAR

- A modular system enabling a range of training opportunities.
- Supplied as standard with a basement, first floor and roof for basic residential fire training.
- Add additional levels and choose from a number of floor plans for more advanced fire scenarios.
- The internal smoke generator with on-board smoke fluid reservoir is located in the basement of the structure. Smoke channels built into each level are used to fill the entire structure or specific rooms with smoke.
- The handheld controller can be used to operate the on-board smoke generator and fans.
- All windows and doors are fully operational and ventilation holes are included in the roof.
- Internal doors are operated with cables and knobs mounted to the exterior of the floor.
- Choose from a number of floor layouts and create a customised model based on your training requirements.

For further information, go to www.haagen.com



Renz Feuerwehrservice

Renz Feuerwehrservice develop and manufactures in their own facilities from where they distribute TYPHOON overpressure ventilation systems which are driven by water, motor and electric power.

The company also produce mobile pressure foam proportioning systems in accordance with DIN 14430 and EN 16327 and carry out proficient pump repairs to almost all manufacturers and undertake the subsequent tests on their own pump test bench.

The conversion of pumps and pipe work is available to the customer individual specification and the company provide sales and service on the whole range of products from Hale, Godiva and Class1.

For further information, go to www.typhoon-fans.de



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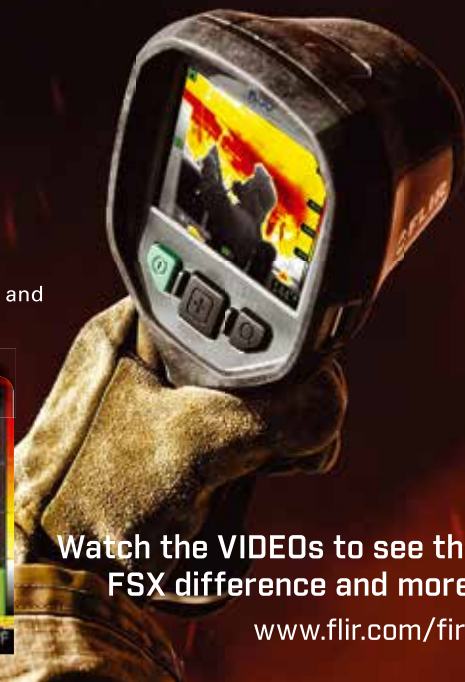
FSX Flexible Scene Enhancement provides an unprecedented level of thermal image detail in real time, making it even easier to find your way through the smokiest conditions. **K55 Video Recording** lets you capture and playback thermal footage right on the camera—ideal for training.



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POSITIVE PRESSURE VENTILATION TRAINER

HANDS-ON PPV TRAINING

The PPV Trainer allows firefighters to control doors, windows and roof vents on a number of floor plans to successfully ventilate a building.

Smoke produced by the built-in smoke generator can be directed to any floor or room with the integrated smoke channel system. Each level has a different floorplan and levels can be added or removed to change the dynamics of the building.

From basic training to advanced positive pressure ventilation tactics, the PPV Trainer helps prepare your firefighters for the real thing.



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Hannover, Germany, 8-13 June
Hall 013 stand G40



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LEADER

LEADER design and manufacture reliable PPV fans and supply them to Fire Fighting services mainly for use in Positive Pressure Ventilation situations.

Known throughout the world as "Easy Pow'Air Technology" it differentiates LEADER from Conventional and Turbo technology competitors.

LEADER Easy Pow'Air fans combine the following advantages:

- **Straight stream air flow** – A very concentrated jet which uses all the air flow generated. They produce exceptionally high air volumes (m³/h or CFM).
- **Greater air flow velocity** – Faster air flow allows the stream of air from the fan to "entrain" even more air and carry that entrained air into the structure.
- **Most effective when placed between 2 and 6 m distance** from an opening with the optimum between 4 and 5 m. This gives fire-fighters greater space and options for manoeuvrability. The fan can also be positioned as close as 0.90 m.
- **Extreme air volume efficiency** – Almost all the "stream" of air from the LEADER fan enters the structure to be ventilated while over 30% of the air of conventional cone-of-air fans strikes the outside of the generally rectangular-shaped entry port and is therefore "blocked" from entering the structure.
- **Higher PPV Pressures** – Independent third party tests of LEADER fans for pressurising stairwells and hallways to prevent smoke and heat and even fire from progressing into unaffected areas of the halls and stairwells have shown LEADER Easy Pow'Air Technology to be much more effective than larger fans using conventional technology.
- **Quick and easy to position** – The fan automatically tilts to a +10° optimal position when lifting the carrying handle. It can also be adjusted to between +10° and +20°.

Visit us on Interschutz Hall 13 – Stand D10 to discover our innovations that are not explained here!

 **For more information,**
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Tele-Aire Fans

Tele-Aire Positive Pressure Fans are designed for reliability and durability to meet all your training requirements. The fans are designed to provide the best value for fire and industrial applications. Their gasoline powered direct-drive allows for a more compact, lighter weight package, powered by Honda Engines. The electric model is designed with a variable speed GFI compatible motor, delivering precise control of airflow. The sealed, water resistant Control Module and Air-over Cooled motor, can be operated in wet and negative pressure situations. The Control module eliminates start-up power surge, allowing the fan to operate on a small 2000W generator. It is available in 16" up to 24" models.

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Unifire

Unifire currently offers the availability of three body styles; DS Series, DST Series, and the Du-All Series. The DS and DST body styles feature a stainless steel wrap-around protective frame and optimized diameter rubber feet to ensure the fan is stand-alone operational. While the DS Series is equipped with four rubber feet, the DST Series provides the ease of use of two rear wheels with brakes and a 35" extendable handle. The wheels are the same diameter as the rubber feet and provide the same stand-alone operation. The DS and DST series are able to be tilted from -10° to +20°. The Du-All series is only available for the electric fans and feature the ability to rotate 360°. All frames feature very low centers of gravity.

Unifire fans feature an open-shroud design, which allows the fans to be placed closer to the inlet of a building thus cutting down on crosswind variables and providing a better seal than closed shroud designs. The fan's cone of air is derived from the shape of our Unitron blade instead of the shroud, as is the case with closed shroud fans, thus providing a wider cone sooner than closed shrouds. Gas models feature high performance Honda motors with an oil alert system which stops the motor if there is too much or too little oil. Electric models feature high performance electric motors with a 250,000 hour runtime and 3/4" shaft versus an industry standard of only 2,500 hour runtime and 5/8" shaft.



For more information, go to
www.unifireusa.com

Super Vac

Super Vac continues to innovate their PPVs in order to make them more user-friendly. The new, patent pending, Valor Series PPVs are the latest design from Super Vac. With a contemporary new look; these frames are constructed of 1.25" aluminum tubing in order to reduce the total weight by nearly 15 percent (frame weight reduction is 35%).

An intuitive step-action tilt mechanism allows the shroud to be tilted at seven different angles. A bigger forward tilt allows easier access to motor controls and stands taller for easier



Russwurm Ventilatoren

You need products which you can rely on absolutely, particularly for high-risk fire fighting operations. ruwu® mobile fans have been developed especially for these situations in collaboration with professional fire fighters. For reliable ventilation in extreme situations or for the immediate removal of explosive gases and dusts. In addition, they are easy to operate, maintenance free and, thanks to their compact construction, fit into any emergency vehicle. Naturally they fulfil all of the safety criteria.

As the first and only German manufacturer of PPV systems with two fan sizes and a successful history, we also keep an eye on the future. This is demonstrated in particular in our special fans which are developed using the latest methods and knowledge. The advantages of an innovative company which still works according to traditional values show themselves here. Resourceful, flexible, reliable, quality-conscious. And this can be seen in all products with the ruwu® logo, which are often used day after day without a break for several years. Outdoors and indoors. Because we also offer "indoor solutions". For example in industry for air distribution, cooling and dust removal. In agriculture for drying and ventilating natural products or for air distribution in breeding farms.

The right device for every purpose

The high performance positive pressure fan (PPV) for professional fire fighters. These are available in two sizes and a wide range of models to match your requirements.

ruwu® fans made in Germany and you have the air under control.



For further information, go to
www.ruwu.de

transportation. The StreamShaper guard comes standard for longer setbacks (can also be ordered with Air Cone Guard) and the easy access shroud allows users to quickly attach flexible duct.

Although lighter and more mobile, this PPV does not sacrifice any of the toughness Super Vac is famous for. The shroud and motor stay inside the true roll cage, protecting them from possible damage. The blade is always aluminum in order to hold up in the high radiant heat of structure fires. Large, flat-proof, rubber tires require zero maintenance and make it possible to go up and down stairs and roll over charged hose lines.

The Valor Series PPVs are available with the same quality motors and engines that were available on the 7 Series PPVs. Whether you are looking for an electric single speed, hazardous location, or variable speed motor, or want a trusted gas engine from names like Honda or Briggs and Stratton, Super Vac has a Valor PPV for you.



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We often highlight technology issues and concerns with vehicles however how often do we hit upon operational concerns and their impact at a vehicle related incident or emergency? Be it concerns around supplementary restraint systems (SRS) or tool evolutions; we need information in the mitigation of such incidents at a motor vehicle crash or a vehicle fire.



David Dalrymple

David Dalrymple is a career EMS provider for the Robert Wood Johnson University Hospital Emergency Medical Services in New Brunswick, NJ and is the former Rescue Services Captain for Clinton EMS / Rescue in Clinton, NJ. He has been actively involved with emergency services for 26 years and is the founder and executive educator for RoadwayRescue.

Beside this information, our operational functions have changed to interact with the dynamic hazards of the vehicles on the street today while many of the topics relate directly to technology concerns, let's take these issues and fuse them to real world solutions.

Many of the operational facets of these emergencies have changed, especially in the recent past. This can be in the form of command and control, tool operations and even patient care. We need to be aware of many of the technological issues with vehicles today to improve the outcomes of the patients we come in contact with. In fact all responders, be it on the rescue tool, manning the protective hose line, performing patient care or the officer in charge, play a key role in providing a better patient outcome and they all need to understand the impact of vehicle technology in their role

and responsibilities. So let's take a good look at each of these operational facets individually.

Command and Control

The buck stops here people – the officer on the apparatus is responsible for the crew and their safety. Whoever performs the scene survey needs to identify hazards, patient concerns and any new vehicle technology (NVT) concerns and issues. In turn, these issues need to be communicated to the crew by the officer to ensure all personnel are aware of hazard. The officer should document NVT concerns and also have access to information on vehicle hazards available on scene. This information source can be vehicle emergency response guides (ERG), text such as Holmatro's 'Rescuer guide to vehicle safety systems' or software such as Moditech's 'Crash recovery system'.



Image courtesy of Roadway Rescue



Image courtesy of Roadway Rescue

Safety

All personnel, especially those performing size up and evaluation must inspect vehicles completely for NVT concerns / hazards. Such hazards when identified are communicated to the officer in charge as well as the rest of the crew. Even though there is a need to perform our size up quickly, it must more thorough and complete than ever before. Scene hazards are a given but we need to read the wreck effectively to capture clues for potential injuries, entrapment and hazards directly related to the vehicle's technology such as motive power, safety systems etc.

All personnel need to take appropriate caution and defensive measures when a vehicle technology hazard is identified. A critical action today is isolating the vehicle's power which is a two step process, first the vehicle ignition is shut down and keys are removed from the vehicle which is especially important today due to proximity ignition. Then we would isolate the battery from the vehicle by disconnecting or severing the wiring and then removing from the vehicle if possible / practical. Such power isolation should then be documented. Think of the ramifications of power isolation – we need to find power accessories such as power seats as part of our size up and there will be times when we cannot perform such power isolation due to crash damage and / or battery locations we are unable to locate. Remember that in over 40% of today's vehicles the battery is outside of the engine compartment and in those

instances we will need to work with more caution than in the past.

Next there is a need for the interior trims need to be displaced to evaluate if potential NVT hazards / concerns are present – if such hazards are present then the entire crew needs to be made aware of the identification and location. Think about what that might be – first off, we need to look for side curtain inflation cylinders as these devices can be found in either the roof posts or roof edges. Second, we can sometimes see reinforcements or structural components in the roof post and edges which is also important depending upon the tools we are using.

Whenever using tools in the area of the passenger cell an appropriate barrier(s) is placed between the patient(s) and the crew members. This barrier can take the form of either soft or hard protection. Soft protection is for use when performing glass management and keeping a clean work area around our patient(s), being a tarp, blanket or a soft cover. When using cutting or spreading tools inside the occupant compartment, the use of a good cutting shield is indicated. A cutting shield is an example of hard protection – today's hard protection needs to be a flexible shatter proof shield since we will need to get into close confines and we will sever hardened materials that can produce small fragments that can fly and have energy.

Finally, debris with potential SRS devices must be identified to the wrecker / recovery personnel as well as all emergency personnel. Care must be

given to these objects especially how they are placed after being removed from the vehicle. A few years ago this would never have been a consideration. Today we must think about the amount of vehicles that have side impact and side curtain airbags which have become almost standard items on most vehicles, be it a car, SUV, minivan or pick-up. This forces us to deal with 'live' and 'loaded' SRS in debris that we might displace or remove in the process of the rescue. When these vehicle components are removed we need to ensure they placed with the sheet metal side down and the interior facing upwards.

Tool Usage / Evolutions

While these practices also can fall under safety, the following are orientated specifically toward tool operations. First off the tool operator observes a 'safe' area in reference to observed NVT hazard / concern(s) which is especially important if we cannot isolate the vehicle's power. For the interior rescuer the observance of 'space' from SRS is pretty difficult to achieve at best. With the average of six to eight SRS devices in a modern vehicle barring a roof removal we have run out of 'safe' space and the use of a good proper cutting shield in conjunction with tool operations near a patient and / or crew personnel has become more and more important.


We need to observe caution and concern when cutting materials where possible NVT concerns are present and give consideration to the tool deployed especially with our power hydraulic




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Image courtesy of Roadway Rescue

cutters but also with reciprocating saws and rescue air chisels.

Hardened materials can be found everywhere in the vehicle, from structural reinforcements to various components. Not only can fragments be produced but sometimes these materials are stronger than the tools we are using to sever them so the potential for blade breakage is greater than ever. Stronger tools and better operational techniques are extremely important today and along with hardened materials the other reason we remove / displace interior trim prior to cutting of roof posts / structure is to ensure that no damage is possible SRS inflation devices. Cutting through a live side curtain inflation module can produce fragments under high pressure which can see upwards of 10,000 PSI in side curtain inflation cylinders today and the potential especially in vehicles with larger sides (SUV, Minivan, station wagons) of more than one inflation cylinder.

Think about this next practice – during the glass management phase only a simple dust mask is worn and not breathing apparatus – Why? Much of the vehicle glass we encounter today is laminated glass or potentially could be so. This type of glazing needs to cut in order for it to be removed from the vehicle since it is bonded onto the vehicle due to its laminated construction of layers of glass and plastic. We have become accustomed to this material in

the windshield but many vehicles today have laminated glass in the side and rear windows for a variety of reasons but one reason in particular is for added structural strength. Think about that for a moment – a change in glazing material to facilitate additional strength in a vehicle's structure, times have changed fellow rescuers and changes are going to keep occurring.

We've mentioned already about power isolation. Along with power concerns think about how this power gets distributed to the various vehicle components. Extensive and ever more complex electrical circuitry, computers and the ability to store power in capacitors and even today our tools can add to this power issue. Whilst unlikely, our power hydraulics can produce a static charge as they pass through plastics – what happens then when we encounter a device such as a side impact or side curtain SRS module and as part of evolution we have to sever wiring to it?

Again unlikely but to err on the side of caution any wiring we encounter should be cut / severed with a hand tool not a power hydraulic cutter and to be on the safe side due consideration must be given to potential SRS reaction.

Let's go back to debris again. Debris from the vehicle, especially roof and doors, are placed into an identified debris pile and consideration must be given to potential SRS reaction (i.e. door(s)

placed with exterior panels faced down-interior facing upwards). This is for a number of reasons – we've already mentioned the issue of 'loaded' SRS in the debris, another would be to keep our work area clear of trip hazards by keeping it all together.

We need to ensure that we keep careful documentation in relation to vehicle rescues for a number of reasons. This is an area that can be easily overlooked but is vitally important for training / educational purposes as we seldom get the opportunity to cut new vehicles during training. If we are able to inspect various pieces of debris and glean information about how it's made, what it's made of and more importantly how our tools fared against it will enable us to build up a knowledge and understanding of the way in which modern vehicles are constructed.

Patient Management

Alright, let us shift gears now. One of the biggest concerns today is how our patients interact with the vehicle – especially the vehicle's structure post crash. For those of you that have been on the job for a number of years, think how motor vehicle construction has changed, in particular, the occupant space inside the vehicle. A door displacement or 'pop' not only gave us enough room to access the patient but also remove them however in most cases today that door displacement gives us patient access and that's about it.

Add into this the vehicle's ability to absorb crash energy readily which allows the vehicle, especially from the front and rear, to crumple up and dissipate that energy. Factor in the interior getting closer to the front seat occupants almost like a cockpit and then think of how seats are configured today. Contoured, racing styled seats are the norm for most vehicles today so is it a wonder most EMS providers today use a rapid removal technique even when it isn't needed to done in that fashion? The packaging devices for a stable patient many times will entrap a patient due to lack of space. Remember head belly toes alignment still is a best practice for patient removal. That hasn't changed.



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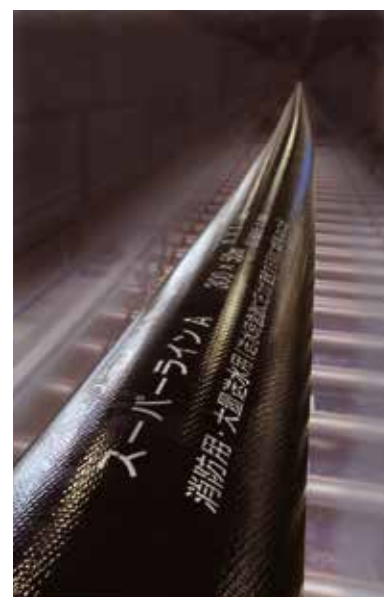
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Weight	kg/m	1.1	1.6	2.8	4.0	4.8
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New 2015 ATEX Regulation for Lighting Manufacturers

The European Regulatory Framework for Manufacture, Installation and Use of Equipment in Explosive Atmospheres, is having important changes to its legislation in 2015. The current revision will be withdrawn April 2nd, 2015, date after which any light certified against this current standard that is not already present on the EU sole will not be ATEX compliant.



Piero Marigo

For a better understanding of the regulation EN 60079-0:2012 new changes and what they imply, it's important to highlight the role of the ATEX certification in ensuring the health and safety of workers. The ATEX Directive (94/9/EC) regulates that manufacturers supply properly certified electrical equipment to be used in potentially explosive areas. The directive is mandatory and states that each area needs to be classified according to the potential hazardous risk so that only appropriate certified equipment can be used there.

In an ongoing effort of guaranteeing the safety, the regulation has been updated and a new ATEX regulation will come into force during 2015 following the version EN 60079-0:2012.

"For many years we comply with the ATEX regulation so that our lighting solutions offer the highest safety guaranteed to workers in hazardous atmosphere environments, such as Fire and Rescue, Oil, Petrol, Pharmaceutical, Chemical, Mining and other industries." Explained Greg Kang, Director of Product Development for Lights at Peli Products. "To meet the exacting



Image courtesy of Peli Products

Piero Marigo is Managing Director EMEA at Peli Products S.L.U.



Images courtesy of Peli Products

requirements of ATEX directive 94/9/EC, our lights are tested to ensure that they pose no threat of ignition when operating within hazardous locations. Using approved laboratories, the lights are tested to guarantee that they will withstand rigorous impact and drop tests, severe environmental exposure and meet a minimum of IP54 water and dust ingress protection. Therefore, longevity and safety are assured by design."

What do the NEW ATEX regulations mean?

With this change manufacturers will have to modify and update the ATEX approved lights to make them compliant to the new release of the regulation. Already, some companies are working

since last year in order to comply these changes, because after April 2nd the products placed in the market must conform to the new standard (EN 60079-0:2012).

"We have been working on adapting our products to the new ATEX regulation since 2014, when we were informed about the upcoming variation," said Greg Kang, Director of Product Development for Lights at Peli Products. "As stipulated by the new regulation, at Peli we are adapting our range of over 16 ATEX lights to the new changes that include the use of anti-static plastic material and coatings in parts of the light. These updates vary for Zone 0, 1, and 2 lights and also by gas groups, and ensure the safest solutions for volatile environments."

Significant changes of the new standard of the ATEX regulation

Depending on the lights and Zones, some of the more important changes are the need to mold in anti-static material or apply anti-static coating to the lights in order to successfully approve the test. These changes may imply modifications of the light output depending on the model, however, manufacturers like Peli guarantee that the light remains powerful to effectively illuminate while eliminating all risks for users when using the lighting solution.

"For manufacturers the new ATEX regulation means that after April 2nd the products placed in the market must conform to the new standard (EN 60079-0:2012), however, while the changes in the current models are taking place, any product already in service or in the distribution chain can continue to be used or sold," explained Piero Marigo, in regards to the new changes' impact in the market.

Moving forward, and with safety as the highest priority, new announcements of the updated models of lights in the European markets are to be expected, as soon as the new ATEX regulation starts in April.

 For more information, go to www.peli.com

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	SUBSTANCE	TYPICAL ENVIRONMENTS	EUROPEAN CLASSIFICATION	VOLATILITY
CLASS 1	Flammable Gases, Vapors or Liquids (Acetylene, Hydrogen, Ethylene, Propane)	- Oil Refinery - - Paint Warehouse - - Offshore Oil Rig - - Spray Booth -	Category 1 / Zone 0 (Hazard Certain)	MOST ↑
			Category 2 / Zone 1 (Hazard Likely)	
			Category 3 / Zone 2 (Hazard Not Likely)	
CLASS 2	Combustible Dusts (Metals [Dust only], Coal, Grain)	- Coal Mine - - Grain Silo - - Munitions Factory - - Hay Storage Facility -	Category 1 / Zone 0 (Hazard Certain)	
			Category 2 / Zone 1 (Hazard Likely)	
			Category 3 / Zone 2 (Hazard Not Likely)	
CLASS 3	Ignitable Fibers & Flyings (Machined Magnesium)	- Paper Mill - - Woodworking Facility - - Textile Mill - - Cotton Gin -	Category 1 / Zone 0 (Hazard Certain)	↓ LEAST
			Category 2 / Zone 1 (Hazard Likely)	
			Category 3 / Zone 2 (Hazard Not Likely)	

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Tactical Developments in USAR Coordination

Urban Search and Rescue (USAR) procedures and techniques have been honed over many years drawing on user / rescuer experiences of tragic events such as earthquakes and typhoons, tsunamis and tornados, as well as man-made crises such as urban terrorist attacks. These techniques and procedures are constantly being upgraded, with advances in technology enabling equipment improvements, and fresh strategic-level thinking offering new and improved ways of responding to and coordinating crises situations of all kinds.



Mikael Westerlund

In the past 10-15 years, high density urban areas around the globe, where, in the main, people live and work in concrete and reinforced-concrete buildings, have experienced an increase in disasters of all kinds, which, in turn, have introduced a fresh and increased demand for USAR capabilities both tried and tested as well as new and improved.

USAR involves specialist teams with specialist skills which, between them, are intended to cover all the known eventualities that might be encountered when entering/being deployed into a crisis situation. Search, rescue, management, medical and logistics functions are all part of typical USAR team specializations; but while international deployments of USAR teams from different countries have helped rescue many trapped victims over that period, new lessons have led to a clear understanding that all those different USAR teams, no matter where from, needed to be coordinated by a central system that would ensure the best use was made of all the available and arriving USAR resources on the ground.

This is where the International Search and Rescue Advisory Group (INSARAG) comes in; under the auspices of the UN's Office for the Coordination of Humanitarian Affairs INSARAG facilitates coordination between international USAR teams prior to disasters, typically earthquakes, and involving building and structure collapse. The group established the INSARAG External Classification (IEC) of international USAR teams

based on their respective operational capabilities designed to ensure that only the right resources are deployed to an event. In addition, the INSARAG External Reclassification (IER) process is also in place and an accepted measure of continual education and training needed for a USAR team's capabilities to remain current. Together, the IER and the IEC are the INSARAG Classification System. Not only does the system coordinate prior to an event and ensure the right teams are deployed, but it also helps get those resources to the right places on the ground as quickly as possible using its own devised INSARAG USAR team classification system of Light, Medium and Heavy teams, each offering differing skill sets, capabilities and technological support, amongst other things – more on those later.

Strategic-level coordination

As of February this year, a new set of INSARAG Guidelines came into effect having been unanimously accepted by the INSARAG Steering Group. Far too detailed and involved to go into in great detail in this article, one area of evolutionary thought is about On-Site Operations Coordination Centre (OSOCC) issues. The concept of an OSOCC has been part of the group's system since it first came into effect in 1991, with new OSOCC guidelines last released in 2009. The aim of the OSOCC is to coordinate and facilitate on-site co-operation between the international responders

Mikael Westerlund is Chief Strategic Officer at Savox Communications.



Images courtesy of Savox Communications

any national agencies which are operating and which will help in establishing a USAR Coordination Cell (UCC). This cell follows INSARAG guidelines and all the international USAR teams will operate through this unit/facility, even to the point that early teams will provide some of the qualified manpower to manage and run the facility and each team will also have to appoint its own UCC liaison officer.

When Medium and Heavy USAR teams arrive in country they must register and confirm their capabilities as per their INSARAG classifications, N.B. Light teams do not usually deploy internationally, and any present at a disaster will normally be a local resource. Deployment of teams is done in a way to ensure the right resources reach locations and situations where they will have most impact. It's at this point that the USAR teams deploy tactically into the field with their equipment, bare hands and experience to guide them.

Victim Location Equipment – Talking to Each Other

When faced with many collapsed buildings and a situation of total chaos, Medium or Heavy USAR teams will deploy two crucial pieces of crucial Victim Location Equipment: search cameras and seismic/acoustic sensor systems. Currently, however, methodologies and technology mean the USAR team operator of either a search camera or life-detection seismic/acoustic sensor system operates in isolation and is tied to that single search tool. He has no means of communicating his progress of the sudden discovery of possible signs of life other than by manual means with his team around him and would typically be the same operator for both bits of kit, first using the life detection sensor system and only then using the search camera system – a lengthy process.

Thanks to a new communications solution devised to enable life detection operators to communicate with other members of the USAR team, that situation is now changing. Whether individual operators, or two working in tandem, the new Search-com device from Savox Communications allows search-tool operators to communicate with other team members over two-way radio,

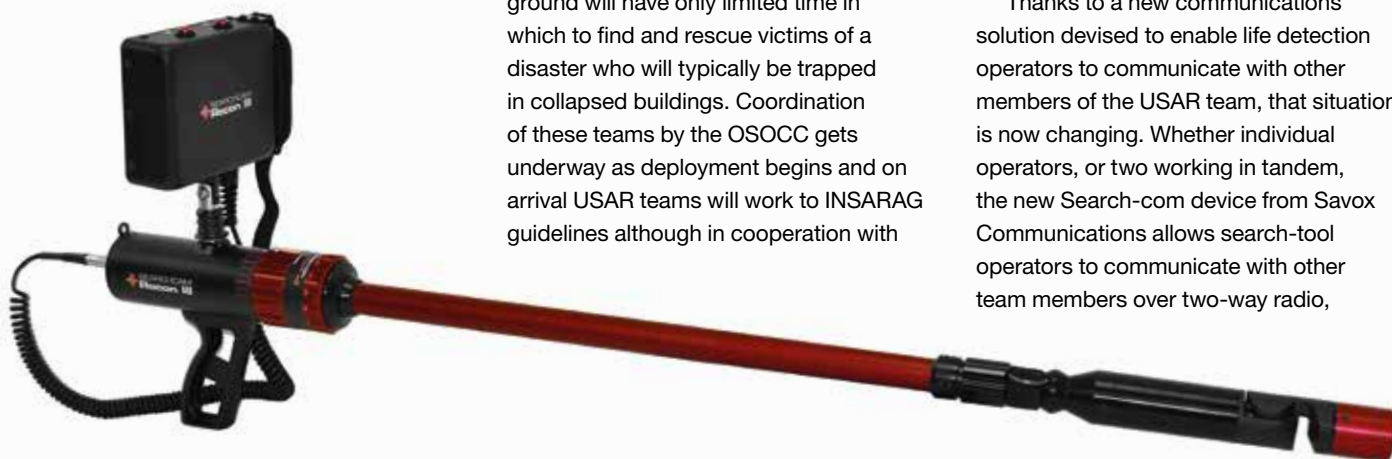
arriving at a disaster scene should one not be available from the country affected. As part of that it has to establish a physical space or coordination centre so incoming teams have one place of command and control to and from which they can operate optimally. What the new 2015 guidelines emphasize are OSOCC procedures in greater detail than before and the importance of such strategic coordination in large-scale events and the need to look at new methods of OSOCC operations going forward.

On the Ground

In countries where the UN way of doing things is an accepted process, there is normally a resident coordinator for

the UN who will have a team that helps ensure inter-agency coordination with that nation's government. They will have 'prepared the stage' as fully as possible prior to any disaster situation arising. Then, when an actual event takes place, a humanitarian coordinator (sometimes the same person) for the UN in that country will take control of humanitarian coordination in support of the national government where there has been a request and formal invitation to do so – the UN and other agencies will only conduct humanitarian activities at the request and invitation of a sovereign state; (having UN people already in place does not always mean help will be requested).

Taking for read that the UN system is in place, USAR teams arriving on the ground will have only limited time in which to find and rescue victims of a disaster who will typically be trapped in collapsed buildings. Coordination of these teams by the OSOCC gets underway as deployment begins and on arrival USAR teams will work to INSARAG guidelines although in cooperation with



increasing the efficiency of the search team on the ground through more efficient communication and enabling them to use multiple search tools, simultaneously.

For more than 15 years Savox has been one of the leading manufacturers and suppliers of search cameras – Searchcam 3000 – and seismic/acoustic listening devices – Delsar LD3 – which has provided a huge amount of feedback from end users of what have become almost de facto industry standard solutions. USAR teams are continuously working on better and more efficient working routines in order for them to be able to save more lives in these extreme and time-critical situations, where the difference between life and death can often be measured in seconds. By combining this valuable feedback over the years with one of the other core strengths of the company – communications – Savox has arrived at Rescuecom, which is set to have a major positive impact on the operations of USAR teams worldwide. The solution provides a totally new use case for USAR teams by combining traditional search and rescue systems and tools, such as Searchcam 3000 and Delsar LD3, with increasingly important team communications for improved efficiency within the team structure. It is also a universal/technology-agnostic product not only compatible with the original Searchcam and Delsar SAR products from Savox, but also other 3rd party life-detection sensor systems and search cameras. And while two-way radio may be the preferred option of many teams on the ground, Rescuecom can also be assigned to operate through mobile phones, smart smartphones and tablets. It can be used as a remote speaker mic in the event the operator does not want to use a headset; it has separate PTT buttons for each PTT-capable device so as not to compromise the PTT capabilities of the other devices it's being used with.

The new Rescuecom system has its own volume control, which is important to ensure listening with the life detection devices is not affected by the new integral radio communications facility, and it also benefits from the broadest range of alternative headsets available instead of simply traditional behind-the-head earmuff headsets. This draws on Savox' vast experience in this area and headset types include:

- SNR-rated and approved passive hearing-protection headsets
- In-ear, active-noise-reduction, hearing-protection headsets
- Active noise reduction, behind-the-head hearing protection headsets
- Helmet-mounted bone conductive headsets

There are also respirator communications options for using Rescuecom with breathing apparatus in use by most fire and rescue agencies.

Rescuecom technology has already been fielded by a number of NATO Special Forces and its durability has been proven in combat situations to ensure it is fit for purpose. There is currently no other



communications solution that can link the various life detection systems in use by USAR teams.

Footnote – Nepalese Tragedy

It's very easy to sit and write about what procedures and processes need to be followed in a disaster response situation and what USAR teams should do and how they should operate on the ground, without actually being in the 'thick of it'. At time of writing, Nepal and surrounding countries have just been hit by a 7.8 earthquake with thousands killed and many more missing. International USAR teams are already deploying and we can only wish them good luck and success in finding as many people alive as is humanly possible.



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Improving Firefighter Safety

There have been a number of recent developments in fire safety and risk management in the built environment that have implications for the tactical decisions made by firefighters. This article explains how these developments can make firefighting safer and more effective – and how organisations can ensure that their staff understand the new and developing built environment and what it means for their decision-making when protecting people, property and the environment in dangerous situations.



Jon Hall

Almost all of these changes are for the better – the built environment is becoming fundamentally safer – but there is a risk that if we do not capitalise on them and share best practice we will lose some of this benefit and put firefighters and the public at unnecessary risk.

BIM

In the UK, one of the key challenges facing all levels of the construction and associated industries is the ambitious requirement for the use of collaborative 3D Building Information Modelling (BIM) set by the Cabinet Office. In the Government's construction strategy, launched in May 2011, it was proposed that, by 2016, all UK Government construction and infrastructure projects were to use 'information-rich' BIM technologies and processes. Progress across the rest of the international market is also moving forward, although at a slower rate.

For fire and rescue services, the extended application of BIM – when used correctly and built into the lifecycle usage of the building – will make fighting fires safer and more effective. If made available to responders, it will significantly extend the information they have when creating or reviewing tactical plans. BIM will enable well trained fire and rescue service personnel to have a much stronger initial understanding, via prepopulated information, of how a fire is likely to spread in a building – and so how best to protect lives, property and the environment when it occurs. Although this makes people safer, it also places a higher responsibility

on individual responders and tactical commanders to use the information when it is available to them in the best possible way. Inevitably, generic approaches will become less and less relevant.

BIM will also enable fire authorities to further develop the link between their prevention/protection strategies and the operational response that covers the remaining risk. A complete review of the approach to the development of tactical firefighting plans is required where BIM data is available. Using BIM, specific strategies for buildings at particular risk can be developed in much more detail. However, with it comes an increased responsibility to keep plans up-to-date and readily available to responders. A failure to do so will be immediately apparent and increase the scrutiny on a service's approach to the provision of a safe system of work for its staff. They also need to ensure that firefighters know how to respond to, and effectively use, the reams of information they may now have at an incident.

New construction technology

Another key change to the built environment has been the huge growth in inbuilt fire protection measures in newly constructed properties; particularly larger, higher risk structures. As new technologies come to market, buildings will become safer, but firefighting strategies will change. A good example of this is the recent fire at the 86-storey Marina Torch building in Dubai. Despite the size of the fire and the huge flames visible from outside the tower, every resident managed to get out safely and

**Jon Hall QFSM is
Training Director at the
Fire Service College,
Moreton-in-Marsh, UK.**



Image courtesy of Fire Service College

structural damage was limited. This is almost certainly due to the impressive escape route protection now built into new structures like this.

The chief focus of the tactical response will have been on protecting the surrounding area and residents who had made it to the ground, rather than having to deploy all available responders to rescue trapped residents further up the tower. This is a very different approach from the one that would be required on a traditionally designed and constructed high-rise building using older construction methodologies.

Again, this is fantastic news – it reduces the risk to the public and firefighters alike. However, fire response teams need to understand these changes. They require up to date information, not only on what the impact of new technologies will be, but also on what has been designed into the high-risk buildings in their area. This is where BIM becomes particularly useful – as well as strong information sharing partnerships with local organisations, public sector bodies and private businesses.

New firefighting technology

New technology for firefighters themselves is obviously also making an impact on tactical decisions made on the ground. Technology like the ColdCut Cobra®, which allows firefighters to make small incisions into enclosed spaces and fight fires without having to effect full entry, is changing firefighting for the better by improving safety and saving lives. However, as each new technology emerges, it requires a detailed review of firefighting tactics to ensure that money is spent effectively and equipment is used in the most appropriate way.

Likewise, better understanding of tactical ventilation techniques and the use of positive pressure fans to control and create beneficial airflow all have

their place, but only with a detailed and comprehensive understanding of the method of construction and design of the building.

Timber-framed construction

The rise of greener building practices and an increased focus on sustainability has had a positive impact on the environment but it has had a knock-on effect for firefighters. Timber-framed buildings are no more inherently dangerous than buildings constructed using higher-tech materials – but they do require specialist management and fire behaviour is fundamentally altered, particularly during the construction phase.

The greatest fire risk undoubtedly arises ahead of completion, due to

A key change to the built environment has been the huge growth in inbuilt fire protection measures in newly constructed properties; particularly larger, higher risk structures.

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the amount of exposed flammable material. Other risks that commanders and crews need to be aware of include the higher risk of structural collapse in the early stages of a fire's development and the increased risk that fire may rapidly spread to adjacent compartments or properties. All of these aspects need to be taken into account by firefighters on the ground – and services will wish to ensure that their teams are prepared. This means that training must be updated, particularly in areas where timber-framed construction is now being used on a regular basis.

Conclusion

As the built environment evolves and changes, fire authorities all over the world need to ensure that they understand how it is changing and what it means for their tactical decision making. Keeping training and policy up to date requires more collaboration and partnership working across fire authorities, government bodies, industry associations and the private sector. Particular attention must be paid to the international perspective, particularly in the western world. More and more, cutting edge construction and design techniques are being developed in the Far and Middle East – and it is vital that learning and best practice from around the world is shared as effectively as possible.

At the Fire Service College, we have built fire safety elements into all of our courses. We ensure that training is as up-to-date as possible by working with a broad range of partners. This includes the Institution of Fire Engineers (IFE), whose international branches have proved vital in sharing knowledge about new strategies and the impact of new equipment. The College delivers learning and development against the level 3 Certificate in Fire Safety and both the level 4 Certificate and Diploma in Fire Safety. These occupational awards, when combined with the engineering-based examinations from the IFE, provide a substantial level of assurance to service managers and authorities as well as substantial evidence should their safe systems of work ever be questioned.

We also work with organisations including the Building Research Establishment (BRE) to ensure that we can provide thorough briefings and training on the specific risks that come with new design and construction techniques. Other key links include our work with the Fire Protection Association – based at the College itself – and standards bodies across the UK and beyond, including the International Standards Organisation (ISO). This means that we can be confident that the training we provide to the UK fire and rescue services, international fire services and the private sector meet the high standards that should be demanded for this high-risk environment.

We, in turn, then share the expertise that we develop at the College across all industries impacted by fire safety. We do this particularly through our work with the Fire Sector Federation, which works to ensure the free flow of information across all organisations that have a stake in developing this best practice.

It is only by nurturing these links and building all that expertise into our training courses that we can be confident we are keeping students abreast of an ever-changing landscape of best practice. For other authorities worldwide, regular training, reviews of policy and close partnership working are the key tools to make sure that the public and your firefighters are as safe as possible.



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The Hungarian Disaster Management Operational Service

The national disaster management system has significantly changed in the past few years. The act of disaster management (CXXVIII of 2011) changed the structure of disaster management system, while the complementary regulations include the mandate of functions. New act and the government decree (234/2011 on the execution of the Act on Disaster Management) entering into force on 1st January 2012. The main substance of the act is that the fire-fighting and the technical rescue are responsibilities of the State.



Tamás Tímár

Tamás Tímár is Head of Disaster Management Operational Service, Békéscsaba, Hungary.

The four pillars of the act are the strengthening of the protection against major accidents involving dangerous substances, the improvement of population protection, the development of the system of civil protection and the establishment of an uniform and strong disaster management body, including the formulation of the maintenance and control of professional fire brigades by the State."

Operational fire protection tasks belong to the professional fire brigades. The entire territory of Hungary – as an operational territory – is covered by professional fire services. One of the elements of this renewed structure is the Disaster Management Operational Service (DMOS), which stepped into operational phase as a separate organizational body in every county and the capital in 1st April 2012.

Present situation

National Directorate General for Disaster Management (NDGDM)

- County disaster management directorates (20)
- Disaster management branch offices (65)
- Professional fire headquarters (105)
- Disaster management posts (58)

- Municipality fire brigades (60)

- Industrial fire brigades (72)

Organization

The regional bodies (20) operating under the Ministry of Interior National Directorate General for Disaster Management (NDGDM) are the county directorates of disaster management. The directorates obliged to run a standby service to have professionals on duty; this is the DISASTER MANAGEMENT OPERATIONAL SERVICE (DMOS), they operate at every Disaster Management Directorate. The members of the DMOS fulfil their duty by acts, regulations of the ministry and the director general.

The structure of Disaster Management Operational Service

The operational area of this duty corresponds to the area of belonging directorate of disaster management. This means that any given DMOS is only entitled to intervene or supervise the events and fire services' interventions inside its county. The fulfilment of this duty requires 24/48 shifts with constant standby at the station of duty (this means 1 day duty, two days off). The number of

Comparison Of Annual Deployment Data By Type	Operations	Fires	Technical rescue
2012	69387	35284	21260
2013	55451	18637	25498
2014	57265	18115	27407



- for the direct order of the county's inspector general of fire services;
- if the chief of DMOS decides in order to control the elimination of the event or reasonable based on the feedback.

Alternate deployment possible as follows:

- if on-site inspection or on-site control is necessary.

The members of DMOS are required to deploy in 2 minutes after the alert.

The DMOS supervise and control the safe intervention of the responders on site. During the intervention the first but foremost task of the DMOS is to help and support the independent work of eligible chiefs of firefighting in commanding. In reasonable cases they can take over the command. In case of emergency situation the DMOS immediately starts to eliminate the situation. In case of large scale, complicated events, which require huge amount of forces the DMOS take part in the organizing and controlling the commander staff. Initiate the engagement of volunteer rescue services and controls their activity on site.

The Service cooperates with the integrated operations control, that means:

- Main Duty Service in NDGDM;
- Main County Duty Service;
- County operations control duty office.

The on-duty system of disaster management operates a 24-hour service at the national, district and local levels to receive reports and emergency calls from citizens, and it carries out reporting and data provision activities to superiors and partner organisations.

IT developments helps to the Service:

- Integrated alert system
- Modern decision support
- Investments in informatics
- SHIELD programme (for alerts)

The DMOS is constantly monitoring the availability of necessary personal and physical means of safe interventions. They pay special attention in presence of hazardous materials also in case of rescue operations from heights and

days of duty, the day-offs and holidays are pre-set by the internal regulations.

The number of DMOS is 9 persons in each county from which 3 persons are chiefs of duty, 3 persons are deputies and 3 persons are safety and security officers (2-3 persons per day). On the top on that there are 5 persons in the capital as drivers, where the daily minimum for the number of persons on duty is 3 (2 persons + 1 person as driver). The prerequisites to be a member of this group are BSc or MSc in fire service, entitlement to be a chief of fire-fighting, 2 years spent as chief of fire-fighting, drivers licence with high level exam (blue lights, siren, hooter), also health related requirements.

The duty of DMOS starts between 6.00 – 8.00 and lasts until next morning. During the shift turns they have a briefing to share information, check the equipment (e.g. measuring tools, detectors, breathing apparatus). The radio check executed at turns a well. During daytime there are pre-defined tasks to take care of: organizing drills, controlling, holding courses. From the takeover to the handover of the given 24 duty, the chief of the DMOS has the responsibility for the staff, the vehicle and the equipment belongs to it and to keep to the order of the day.

Deployment of Disaster Management Operational Service

The level of alert determines the volume of forces required to eliminate a fire event. The level of alerting can be I. to V. The type and the number of alerted vehicles are defined by the operations control centre. Alerting the OSDM is required in the following cases:

- in cases of level II. (2,5-3 unit) or higher alert level;
- if at any sites a firefighter injured seriously, desperately wounded or died;
- if the county's or capital's main- and operations control on duty decides based on the feedback;
- if the chief of fire-fighting on site asks for consulting in case of complex, complicated events (technical rescue, craning, rescue from heights/depths, accidents caused by fallen trees, alpin, etc.);
- if there is a need in DMOS's special equipment on site;
- if the fire fighter vehicle had an accident and it caused personal injuries;
- for the direct order of the county's director;

Disaster Management Operational Service	All actions	Operations	Receipt management
2012 (from April)	5336	2212	471
2013	9054	3632	689
2014	8455	2994	635

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	Number of Fire Investigations
2011	1487
2012	1180
2013	1009
2014	716

Investigation Advisory Board provides assistance in organizing the work of fire investigation. At the meetings of the Board the regulation, issues in connection with the implementation, the equipment and personnel requirements of fire investigation are discussed.

Conclusion of Disaster Management Operational Service:

- to support the rejuvenated intervention staff at fire services, who are eligible for fire fighting management,
- in case of need it takes over the management of fire extinguishing,
- performs 24/48 hours standby duty service,
- alert time 2 minutes,
- it has to move to the damage site with the pre-determined equipments,
- it implements operations analysis,
- continuous monitoring of the existence of necessary conditions for safe intervention,
- supervision of fulfilling service.

Tasks of the DMOS are the fast, efficient and safe interventions during firefighting events (fires, accidents, and other damage control); drawing precise conclusions accounting for every detail during fire tests and the analysis of interventions, which can then be used in the field of prevention and intervention; and coordinating the tasks related to the fire fighting and technical rescue activities. The main task of Disaster Management Operational Service is SERVING HUNGARY'S SAFETY.

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depths. They collect data about the use of personal protection kit, their fulfilment or probable shortcomings or damages.

Exercises

They organize drills for the fire service units in the area in order to train or to control them. They organize the situational exercises of fire and technical rescue operations, also control those which are not organized by them.

Organizing, managing, monitoring and controlling table top exercises, fire extinguish drills, joint emergency management exercises are also amongst their duties. In the area belongs to them, once in every half year the OSDM hold controls to evaluate the followings:

- after office-time they check the standby duty;
- check the drills;
- check the training courses (theoretical, technical, sport activity etc.);
- check the shift turnovers.

The official documents of Disaster Management Operational Service:

- event logbook;
- duty logbook;
- the Simplified Fire and Technical Rescue Plans in their operational area;
- basic acts, regulations, internal regulations and joint agreements related to duty;

- the official documents and printouts for control;
- direct order;
- handbook or software of identifying hazardous materials;
- monthly work plan.

Fire Investigation

If any damage happen and the investigation officer is prevented, than the Disaster Management Operational Service need to start the process.

Reasons of fire investigations can be:

- Alleged offense
- Firefighter injured
- Death
- Malfunctioning fire detector
- Qualified degree fire
- Considerable damage value
- Professional reasons

Last years approximately half of the fires occurred as a result of using open fire. Emphasis is put on the training of fire investigation staff. In addition to our own training program our staff is trained by police and USA fire investigation professionals. The Fire

Disaster Management Operational Service	Exercises	Control
2012 (from April)	933	2191
2013	1180	4242
2014	1228	4233



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The World's First Ship with Fire Safety Adapted to Methanol

The world's first ship to run on methanol will soon sail after the fire risk assessment by SP Fire Research was approved. Methanol has for long been handled with traditional fire protection in cargo pump-rooms on tankers, but a deeper understanding of the fuel called for a new approach to design fire safety.



Franz Evegren

Franz Evegren was a bosun a few years before becoming a Fire Safety Engineer. With an additional degree in Risk Management and Safety Engineering he ran a consultancy business for some years before becoming a research scientist at SP Technical Research Institute of Sweden. His focus the past 5 years has been development of methods for risk assessment to evaluate alternative designs of fire safety on ships.

Solution to the SECA challenge

The Stena Germanica is a so called ro-pax ferry, bringing vehicles and passengers across the Baltic Sea. This area is together with the North Sea and the English Channel a so called Sulphur Emission Control Area where stricter regulations to minimize emissions have faced the shipping industry with some serious challenges. Similar restrictions apply around North America and several more areas are planned around the world in the future. The new requirements have demanded new technological solutions, including use of alternative fuels and exhaust gas after-treatment. Many shipping companies have chosen to make use of LNG to meet the requirements and avoid gas after-treatment. The same is achieved using methanol, but for this fuel the transportation and storage is far less complicated, both on the ship and ashore. Furthermore, there is a great benefit with methanol in the possibility to make it renewable from biomass in large scale in the future. Therefore Stena chose methanol for the Stena Germanica when it came to complying with the new regulations.

The regulatory way for low flashpoint fuels

The flashpoint of methanol is far from as low as of LNG but still lower than what is permitted by the international maritime fire safety regulations in SOLAS (Safety Of Life At Sea). An international code under SOLAS on safety for ships using gases and other low-flashpoint fuels (the IGF Code) is under development. However, until such a code is ratified the only regulatory way forward is to show equivalent safety through SOLAS regulation I/5 or II-2/17. These regulations provide openings for alternative design and arrangements for fire safety but require that safety is not compromised. Hence, use of a low flashpoint fuel as methanol and the necessary safety arrangements can be treated as alternative design and arrangements for fire safety. It is then necessary to carry out a fire risk assessment to demonstrate how the particularities of methanol are managed to assure that fire safety is not adversely affected.

▼ The smoke from Stena Germanica is but a memory as the ship converts to methanol.





detection and localization achieved when a methanol fire doesn't show flames or produce smoke? And how is extinguishment performed when the fuel in addition to the low flashpoint also has wide flammability limits and bound oxygen? These questions went beyond traditional fire protection and required further analysis.

In the project it was decided that the ship should be designed at least as safe as a conventional ship in each affected area of fire safety. To manage this, a number of risk control measures were added. For example, all fuel piping was designed double walled and butt welded. The only space where methanol is managed in single walled pipes is the pump room. Here a robust drainage system was designed and the equipment used is suitable for explosive environment (ATEX). Furthermore, a smart gas detection system was designed automated with the ventilation and the pump system; if a low level of methanol is detected the ventilation is increased and if a high level of methanol is detected (still far below the flammability limit) the 700 bar methanol transfer to the engines is stopped. An automatic seamless transition is then made to run on diesel only and methanol pipes are flushed with nitrogen. The methanol storage tank will be constantly inerted with nitrogen to avoid a combustible atmosphere. Furthermore, the tank will be surrounded by water on all sides (seawater and permanent ballast water tanks) which will directly neutralize the miscible fuel in case of a leakage. Bunker tanks in the double bottom also allow an unproblematic and efficient storage.

Detection was managed by smart installations of detectors made to distinguish the electromagnetic radiation emitted when carbon dioxide is produced at combustion. Thereby the detection system was made independent of smoke and visible flame signatures. To localize fires when performing manual firefighting, infrared cameras were provided to the fire patrols.

Effects of fixed fire-extinguishing systems

The fixed fire-extinguishing systems required particular engineering efforts. In particular two common system alternatives were evaluated:

▲ Characteristics of alternative fuels need to be considered in design of fixed fire-extinguishing systems.

The greater use of LNG means that class rules and draft IMO regulations have been further developed for this fuel than for methanol. These are in many parts applicable also for methanol installations. However, the sparse requirements on fire safety and the particularities of methanol made it clear that a fresh approach was necessary to address fire safety. The fire risk assessment was performed by SP Fire Research as part of the large technical methanol conversion project at Stena, involving classification society Lloyd's Register, engine manufacturer Wärtsilä and ship designer ScandiNaos as key partners.

Beyond traditional fire protection

In the first steps of the fire risk assessment it became clear that not only fire hazards associated with the lower flashpoint have to be regarded for alternative fuels, even if this may be the only deviation. What is thereby addressed is generally the increased probability that flammable vapors of a low flashpoint fuel will accumulate and possibly ignite in case of a leakage. However, it is not sufficient to only minimize the probability of leakage and ignition. A sound fire safety design must, as any regulatory framework, address all levels of fire safety.

In the fire risk assessment, fire detection and fire extinguishment were identified areas in need of further investigation. For example, how is





▲ Fixed installation outlet.

► A fire test being carried out.



inert gas (carbon dioxide, CO₂) and high pressure water-mist. Several particularities of methanol led to realize that extinguishment would be harder to achieve. Methanol can for example burn down to an oxygen level of 12%, which makes it relatively less sensitive to dispersion. The effectiveness of an inert gas system with CO₂ is thereby reduced and more gas is required to achieve an equivalent extinguishing effect as for diesel. Requirements state that a conventional CO₂ system in machinery spaces should be designed to give a free gas volume equal to at least 40% of the space volume. A theoretical study based on the minimum extinguishing concentrations for diesel and methanol and safety margins in the FSS Code showed that this amount had to be increased by about 25% to assure an equivalent effect.

When it comes to the effectiveness of a water-based system the insensitivity to oxygen dispersion plays part of the role. Furthermore, the lack of soot in flames makes flame cooling less effective and the low flashpoint makes direct surface cooling less relevant. For a water-based system the primary extinguishing effect is instead dilution. The fuel will no longer vaporize in sufficient amount when the surface layers of have been diluted to approximately 75% water content. Hence, a water-mist system may protect surroundings and firefighters

by cooling and to some extent suppress a methanol fire by dispersion of oxygen but extinguishment will be difficult to achieve. This was verified by full scale fire tests. Some kind of additional system would be necessary to assure that a methanol pool fire is extinguished (by dilution or foam coverage) if not drained. In particular in case fuel is in connection with heated obstructions, which will increase vaporization.

Considering these characteristics of methanol it is possible that a traditional water-spraying (sprinkler) system would provide more effective extinguishment. More water from such a system could provide both better dilution and cooling, but at the cost of reduced visibility and potential stability problems. However, further investigations and tests are necessary before such a conclusion can be drawn.

Fire safe ship and regulations

The fire risk assessment showed that the fire safety challenges of methanol are manageable. It also stressed that it is not sufficient to only address a low flashpoint deviation when considering alternative fuels. To assure that at least the same level of safety is achieved in each affected area, safety margins were used depending on the access to reliable data. Some conservative stands were necessary, for example with regards to fixed fire-extinguishment; it was decided

to use both a CO₂ system with increased capacity and an approved water-mist system. The need for knowledge and verification in this area has now led to the initiation of a new research project called proFlash. The project is coordinated by SP Fire Research and aims to further evaluate the effectiveness of fire-extinguishing systems for methanol and LNG by theoretical studies and full-scale testing. The results will work as direct input to the IMO correspondence group developing the IGF Code part applying to use of methanol fuel. The project may also give reason to further develop the merely two pages of fire safety requirements in the part applying to LNG, which is only formalization away from ratification.

Approval of the Stena Germanica fire risk assessment was given by the Swedish Flag in January 2015. At the end of the same month the shipyard started the new fire protection installations and the ship is now the first to sail international waters on Methanol. By managing each introduced fire hazard Stena is confident that fire safety has not only been maintained but improved by the conversion to methanol. Hopes are that the findings in this project and future research will give a better understanding of alternative ship fuels and safer conversions to methanol and LNG.



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The Three Keys to Swift-Water Boat Rescue

Understanding how the boat operates and how the river behaves are essential to successful swift-water rescues. Of all the technical rescue disciplines, I find swift water to be one of the least forgiving. Rivers are incredibly dynamic environments with an unlimited supply of hazards that can change a seemingly uneventful rescue sequence into a nightmare.



Dalan Zartman

Dalan Zartman is founder and president of Rescue Methods. He is also technical-rescue curriculum subject-matter expert for the Ohio Emergency Management Agency and Department of Homeland Security.

This article originally appeared in the June 2013 edition of FireRescue1 – www.firerescue1.com.

Rescue Methods

Each boat will perform differently in the water as the loads within the boat change. I have observed two prevalent mistakes that novice boat operators and rescuers make. First, they simply do not understand the performance characteristics of their boat and motor. Improper operating techniques may result in rotational capsizing or sudden surges or losses in position in the river. Either of these actions can put rescuers in the water. Second, they develop tunnel vision on a specific problem and forget about the river. The river never stops coming at you and losing sight of it can result in rapid loss of position and an ill-advised ferry angle.

For the purpose of this article, we will be discussing the most common river-based boats within the rescue service

– 3.6 metres to 4.9 metres crafts including standard inflatables, tunnel hulls (a boat hull that uses two typically planing hulls with a solid centre) and jon boats (a flat-bottomed boat constructed of aluminium, glass fibre, or wood with one, two, or three bench seats). Before effectively operating these boats, we need to have a firm grasp of three basic factors:

- Load capacity.
- Performance characteristics.
- Immediate actions.

Load Capacity

Boats may be equipped with a load-capacity placard that displays the maximum allowable weight and/or persons that can be in the boat. This calculation is based on a standard U.S. Coast Guard formula that multiplies the length of the



Image courtesy of Rescue Methods



Images courtesy of Rescue Methods

boat times the width of the boat and divides it by 15. For example: in imperial measure, a 15-foot-long by 8-foot-wide boat would result in $120/15 = 8$.

This formula is based on a 150 lb (68 kg) person, and I do not know many rescuers that weigh 150 lbs. So, use a coefficient of 20 to be on the safe side. This would result in a maximum person load of six as opposed to eight. You also need to consider the increased drag and weight that is generated as you approach the maximum load.

I am a strong advocate of keeping boat personnel to a minimum in swift-water applications to ensure optimal performance of the craft. The best layout for a boat rescue team is an operator or pilot, a primary rescuer and a secondary rescuer if absolutely necessary.

Performance Characteristics

Once the load capacity is known, it needs to be applied on the river to analyse its relationship to performance characteristics of the boat. Generally, inflatable crafts are much more stable than jon boats. This allows more personnel to be placed in the boat with less concern for placement or position. Jon boats can be highly unstable and require great attention to load positions in the boat to prevent taking on water and capsizing. This principle is particularly important when turning the boat or applying sharp ferry angles.

During these manoeuvres, it is imperative that the crew understands how reactive the boat is to load placement near its sides. In unstable boats, crews should shift their weight to the downriver side when performing turns if the goal is to maximise boat stability. However, the result is a wide turn radius. If a tighter turn is desired, the crews must be aware of their particular boat's reaction to inside loading to ensure that they do not overload it and allow water to rush into the boat and cause a rotational capsize.

Each of the primary boat types turn very differently. Standard inflatable boats typically perform a sliding motion across the surface of the water. Jon boats and V-bottom boats slide less and will naturally turn tighter. Tunnel-hull boats have two rails in the water that produce extremely tight turns that generate up to four Gs when performed at maximum operating speed.

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Motor Operations

When setting up a boat, the motor must be set at the appropriate angle with the appropriate propeller to ensure that maximal water is drawn through the propeller and not an air cavity.

It is often impractical to adjust the trim of the motor while on the river by any means other than load positioning. For example, many tunnel-hull boats need to have as much load in the rear as possible to generate enough initial torque to react with maximum propulsion. If a crew knows they are going to perform a peel out or a tight down river eddy turn, they should shift their weight just prior to performing that manoeuvre. Bringing a boat to plane or maximum operating speed may also be impacted by load distribution in the boat.

The last component to be evaluated is overall capability of the boat as it relates to CFS or water movement. Boat crews must know the limitations of their boat – especially how much current is too much for the boat configuration. This will be based on the load in the boat, the drag of the boat design and construction, and the horsepower and prop setup of the motor.



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When Things Go Wrong

It is also important to know how to trouble-shoot and take corrective actions when things do not go as planned. Know the motor inside and out. If propulsion is lost or the motor dies, have a systematic and rapid checklist that you progress through to correct the problem.

The crew should also have a course of corrective actions to try to maintain a safe boat position in the water with paddles. This is one example of immediate actions, which should be rehearsed and performed with great repetition to develop muscle memory. Once the boat itself has been addressed, operators and crews

need to understand the dynamics of swift water. Rescue sequences typically require a large array of boating skills from ferrying, hovering and peel outs to river reading, avoiding and identifying hazards and victim retrievals.

Divided Attention

One of the hardest disciplines to develop in novice operators is the ability to keep the nose of the boat up river with no ferry angle and maintain position in the river while a victim is being loaded. This is commonly referred to as hovering.

Operators will naturally want to shift their focus towards the rescuers and victim

during loading. This generally results in an accidental ferry angle being set towards the victim because the operator is staring at that receiving point on the boat as opposed to looking up river to hold position.

In a narrow shoot with fast water, even a 15-degree ferry angle can cause a boat to careen towards the bank and the operator may not be able to recover boat position in time to avoid further injury to the victim and damage to the boat and crew. Conversely, an operator who is completely honed in on a hazard in the river but has lost focus on his rescue crew and the victim may fail to respond appropriately to their needs.

We address this dichotomy during training by encouraging operators to divide their senses. They are instructed to keep their eyes on the water and their ears attuned to their rescuers.

Training Tips

One of the best drills or events to apply this is in victim pick-ups. The boat will always approach the victim from the down river side. We require operators to maintain boat position and hover during a victim pickup as well as capture the victim and perform a down river peel out with the victim on the down-river side of the boat.

In more forgiving water conditions, operators should always bring their motors to neutral during victim pickups to negate the possibility of a prop injury to the victim. In swift water however, losing operational control of the boat by going to neutral could be catastrophic.

We train our rescuers to convey specific verbal commands to the operator when they grab, capture and pull in a victim or command a peel out. If the rescuer is losing the victim, he or she communicates to the operator to either “peel out” to come around and relieve current pressure on the victim or “kill it” to bring the motor to a neutral or zero energy state.

The key is to develop refined boat operating skills through repetition and exposure to different water conditions as well as strong situational and environmental awareness using all senses. Boat-based rescue operations can be tremendous assets or liabilities to rescue organizations.

Get the boats out of the bay and onto the water to insure they will be an asset.

The key to successful boat rescue is to develop refined operating skills through repetition and exposure to different conditions, as well as strong situational and environmental awareness using all senses. Boat-based rescue operations can be tremendous assets or liabilities to rescue operations.



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London Fire Brigade Emergency Planning

London Fire Brigade Emergency Planning (LFBEP), of the London Fire and Emergency Planning Authority (LFEPA), is the driving force in collective London local authority emergency planning, preparedness, response and recovery.



Tom Brady

The team have a number of statutory responsibilities, which are set by the Civil Contingencies Act 2004 (CCA), the Control of Major Accident Hazards (COMAH) regulations, the Radiation (Emergency Preparedness and Public Information) Regulations (REPPiR), and the Pipeline Safety Regulations (PSR).

These responsibilities are:

- To co-ordinate pan-London training and exercising, in support of the LLAG arrangements.
- To undertake regional local authority planning, particularly the maintenance of the London Local Authority Gold Arrangements.
- To provide the secretariat function to the Sub-Regional Resilience Forums
- To produce multi-agency major accident response documents for sites that hold large amounts of hazardous materials.
- To play a key role in the London Resilience Partnership.

In order to adhere to these regulations and discharge their responsibilities, LFB EP deliver an annual, end-to-end, (strategic, tactical and operational) emergency preparedness training and exercising programme for the 33 London local authorities and have changed the landscape of emergency planning in London through driving innovation, utilising best practice and ensuring nose-to-tail consistency for local authorities.

Background of LFB EP in emergency planning

A comprehensive review of London's preparedness was conducted following the significant events of 11 September 2001 and it became clear that London required a means to deliver a co-ordinated, multi-agency response for London. Therefore, the London strategic communication and coordination arrangements were developed. These arrangements were designed to ensure

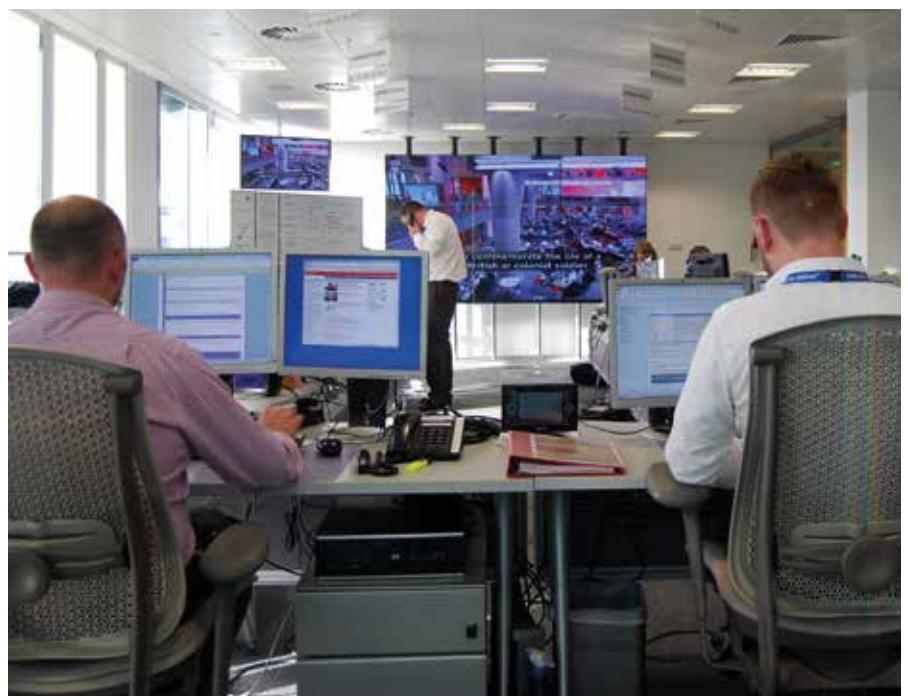


Image courtesy of London Fire Brigade

Tom Brady is an Emergency Planning Officer at LFEPA.



Images courtesy of London Fire Brigade

that the London Resilience Partnership (a coalition of over 170 independent organisations that engage at all levels of resilience) can make sure that London is prepared to respond to, and recover from, any eventuality, mitigating the impact on the city's communities and businesses.

New legislation, guidance and requirements were produced, which placed London Fire and Emergency Planning Authority (LFEPA) in a leading role to develop and co-ordinate emergency planning, response and recovery arrangements for local authorities. This role is undertaken by LFB EP and by developing the London Local Authority Gold (LLAG) Arrangements, a vital component of multi-agency working, ensuring an effective multi-agency response at not only the strategic level but also at tactical and operational levels.

In summary, the role of London Fire Brigade Emergency Planning is to support London local authorities in effectively discharging their responsibilities under the Civil Contingencies Act.

London Fire Brigade Emergency Planning (LFB EP) Role

■ Training:

The team deliver regional training to London local authorities and partner agencies, in order to support the London Local Authority Gold Arrangements. This training takes the form of distance learning and role training and is designed to ensure that there is a pan-London consistency for the essential local authority roles in incident management. In addition, the team deliver Local Authority

Liaison Officer training to support the LLAG structure at the local level and ensure consistency in liaison with other agencies at the scene of an incident.

■ Exercising:

LFB EP design and deliver regional local authority exercises, primarily consisting of:

- A table-top exercise, Exercise Preparer
- A communications exercise, Exercise Connects
- A command post exercise, Exercise Safer City

In the most recent exercises, Exercise Preparer involved 223 local authority attendees, supported by subject matter experts from 19 different organisations; Exercise Connects involved over 220 participants across 35 control rooms and Exercise Safer City involved 600 local authority players and around 600 from across the London Resilience Partnership.

In order to support the London Local Authority Gold Arrangements, LFB EP deliver a comprehensive training and exercising programme to local authority officers, in order to prepare the LLAG and their support team for their duty period. Over the past year, the team delivered three distance learning packages, 27 training courses to 264 attendees and 24 exercises to over 568 participants.

Over previous years, realistic and credible scenarios of marauding terrorist attack, pandemic influenza and building collapse have been created to allow local authorities to explore, test and develop their response and recovery arrangements.

■ Multi-agency planning:

LFB EP play a full and active role in pan-London planning, in representation of the LLAG Arrangements and in order to support local authorities and add value to the process.

The team also produce multi-agency plans to manage the implications of an incident occurring at a Control of Major Accident Hazard (COMAH) site or pipeline, or of a radiation incident that could have impact in the capital. These are designed to bring together all responders and ensure a collective response with clear and consistent messaging throughout.

■ Secretariat:

The organisations within the London Resilience Partnership come together to work closely within the statutory London Resilience Forum (at the regional level) and 33 borough resilience forums (locally), with the duty of assessing risks and implementing multi-agency planning. Due to the size and complexity of London, these forums are supported by six sub-regional resilience forums which promote communication flow between local responders and planners, including businesses and faith representatives at the regional level. Co-ordination, consistency and sharing of best practice are ensured by the secretariat function delivered by LFB EP.

As secretariat for the Sub-Regional Resilience Forum (SRRF), a role that places LFB EP at the heart of London multi-agency preparedness, LFB EP deliver three workshops per year to each of the six SRRF areas. These allow reinforcement of local arrangements through the validation of regional and local plans and ensure that

the best communication arrangements are in place. Representatives from across the Partnership buy-into the workshops and subsequent business meetings, which are chaired by local authority Chief Executives, a commitment that reinforces their significance.

Finally, LFB EP also provide the tools for borough resilience forums to deliver local exercises which ensure regional consistency. While it is not possible to be involved in every local exercise, LFB EP recognise and commit to the need for London-wide consistency at a local level.

■ Oversight:

The Local Authority Panel, made up of eight chief executives, ensure that London local authorities are prepared for the contingency planning challenges faced. In order to achieve this, they commission a group of emergency planning practitioners, from local authorities, to ensure the delivery of priorities, and LFB EP to ensure the effective maintenance of the LLAG Arrangements.

London Local Authority Gold Arrangements

In order to ensure that London Local Authorities can deliver a collected and co-ordinated response, LFB EP maintain the London Local Authority Gold Arrangements (established in 2004), which empower one chief executive to respond on behalf of all of them in a collective, co-ordinated and consistent manner. This is achieved through a joint resolution, agreed by all 33 local authorities in London, empowering the London Local Authority Chief Executive on duty to act as the strategic representative on their behalf, the London Local Authority Gold (LLAG). The LLAG is supported by the London Local Authority Co-ordination Centre (LLACC, staffed by LFB EP and LFB personnel), which links to 33 borough emergency control centres that are charged with managing the incident locally. The London Local Authority Gold Arrangements are scalable and flexible enough to manage both high impact, spontaneous emergencies and protracted incidents across London.

To effectively support this, LFB EP is the pioneer of a system of ensuring that there is strategic representation 24 hours a day, seven days a week, so that should an incident occur which has impacts across

the capital, London local authorities are represented by a chief executive who is empowered to make decisions and incur expenditure. The value of this rota has been proven by the collective and co-ordinated response of London local authorities on numerous occasions and has earned the confidence and trust of strategic leads from the emergency services and across the Partnership.

Not only does the rota ensure that one chief executive (the designated London Local Authority Gold, supported by an extensive training programme, produced by LFB EP) has strategic oversight for the duration of their duty, but also that there is a secondary representative who is able to support or take over, if required.

Minimum Standards for London

The Minimum Standards for London are a set of agreed and adhered to standards (for both preparedness and response) that were introduced in 2007, developed by LFB EP and supported by all 33 London local authorities, with the aim of ensuring a baseline standard of resilience planning across London's local authorities that meets statutory requirements, Central Government expectations, and that is commensurate to London's risk profile. As a result of these standards, London local authorities are the only local authorities to have agreed a set of standards that are regularly reviewed to ensure that they remain fit for purpose.

LLACC

The London Local Authority Coordination Centre (LLACC) ensures effective and efficient support to the LLAG arrangements through:

- Constant monitoring and horizon-scanning
- Timely information sharing and regular communications
- Ensuring successful incident response and co-ordination
- Adding value

The LLACC is made up of LFB EP staff and volunteers from within the London Fire Brigade who co-ordinate the 33 London local authorities and ensure that the London Local Authority Gold is prepared and supported in the event of an incident that requires a co-ordinated response. In order to achieve this, the LLACC is

staffed by on-call officers who undertake continuous training and exercising and form a 24/7 rota.

Incident management

The London Local Authority Gold Arrangements are scalable and flexible enough to manage both high impact, spontaneous emergencies and protracted incidents across London. This has been proved through the management of a variety of different incidents, including the London bombings of June 2005, the response to the poisoning of Alexander Litvinenko (Polonium-210), severe weather (including snow, storms and flooding), London disorder and the murder of Drummer Lee Rigby. The principals of the London Local Authority Strategic Coordination Arrangements were employed to manage the day to day operations of the London Olympic Games in 2012, while still maintaining the emergency response capacity.

Over the past year, LFB EP have supported local authorities and partner agencies in response to a variety of incidents including the threat of Ebola, periods of industrial action, severe weather and pressures on mortuary capacity. This support was in the form of consolidation and dissemination of information to local authorities, identification of trends and, where required, specific resource co-ordination to ensure the continuity of key services.

Support to the London Fire Brigade as a whole

LFB EP work closely with the Operational Resilience Department of the London Fire Brigade in order to integrate operational response arrangements, to deliver on Control of Major Accident Hazard regulation requirements (for both the Brigade and the city) and provide insight to planning that requires multi-agency input. In addition, LFB EP deploy staff to the Metropolitan Police Special Operations Room, in support of LFB colleagues, to ensure the effective co-ordination of Brigade resources during events, periods of industrial action and events that require activation of emergency services co-ordination arrangements.



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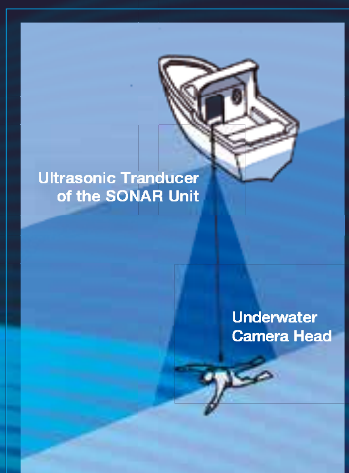
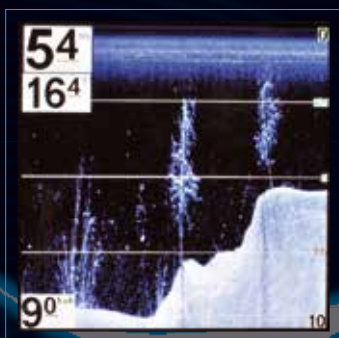
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Counting the Uncountable...



Deborah Keeler

Executive Director, IAAI

Walking around the exhibition halls at several large fire service conferences this summer reminded me of how big ‘fire’ is and the number of dollars spent every year protecting lives and property from fire loss. Fire trucks and hoses, pumps and sprinkler systems, alarms and detectors...the expos showcased hundreds of companies and organizations who were there to share information on their products and services that ‘save lives and reduce loss’ to thousands of individuals from around the world. The industry has come a long way in preparing for fire and fire suppression, documenting the fires responded to, and tallying up the annual cost of fire in respect to deaths, injuries and property loss. But we still have far to go in regard to counting the value of fire safety and prevention.

There is a perceived need to devote more resources to fire prevention, but the lack of effectively measuring what ‘didn’t happen’ limits our ability to know if allocating more resources will save more lives, prevent more injuries and protect our property better. And while fire deaths, injuries and dollar loss should be the dominant criteria for evaluating fire prevention success, fire problems vary country to country and region to region. They are impacted variations such as climate, economic status, education, and demographics to name a few. Just counting the problem gets very complicated.

There is plenty of data documenting the fire problem, but little showing that prevention is successful in reducing fires. Without defining the cost-benefits of prevention, additional resources are unlikely to ever be allocated. Measuring results is important, but quantitative measurement isn’t the only way to solve a problem. A qualitative understanding of why fires happen is perhaps even more important in the realm of fire safety and prevention.

Chief J. Robert Ray writes in his whitepaper on *Fire Prevention Effectiveness: Can We Measure What Did Not Happen?* that, “Fire prevention programs are intended to reduce the fire problem proactively by attacking the root causes of fire, thereby reducing fire deaths, injuries and property loss. To measure fire prevention effectiveness, the fire service needs to distinguish between fires that were the result of preventable causes and those with causes not likely to be prevented...”

Investigating how fires start and how to prevent them from destroying property and life is a crucial science; one that’s been evolving for hundreds of years. The science of fire investigation is beneficial for many reasons beyond identifying arson and ensuring that responsible parties be

held accountable. Determining the cause of even accidental fires is the surest way of improving safety practices and practices that could benefit everyone.

An anomaly within the fire investigation industry is that fire investigation is a role for which responsibility and impact is shared by many industries: the fire service, law enforcement and insurance. Whether it’s fire safety and prevention, fire loss claims and litigation, or arson enforcement and prosecution, the fire investigator plays an important role in determining “where” and “how,” and sometimes even the “why.” It gets complicated because there are many different stakeholders involved in the process and more often than not, the first responder (the fire department) is tasked with making the initial determination. Being first on the scene of a fire loss also carries the responsibility and burden of providing the necessary resources to competently discharge that duty. A weight many departments and communities are unable to shoulder.

Our fire departments and city leadership may understand the impact of the determination of origin and cause, but everyday are forced to make difficult budgetary decisions. The arduous task of defining priorities and aligning resources to critical needs and services may even be the responsibility of someone who doesn’t fully understand the importance and role of safety and prevention. If it’s difficult to count how many fires didn’t occur, it makes sense that fire prevention and associated roles would be some of the easier items to reduce or cut from a tight budget. With the economic crises many of our towns and cities are facing, it’s not even an option.

Another factor may be the ‘it’s not my job’ mentality. Having a clear understanding of prevention and understanding that public safety isn’t limited to only putting the fire out. Seeing the big picture of all of the working parts and how everyone – all of the products and service providers – work together, helps us better understand our individual roles in fire safety and prevention and fire loss. Everyone has a part and important role.

Understanding the importance of fire investigation and determining origin and cause of a fire is a key piece of the fire safety and prevention puzzle. Without understanding where, how and why a fire started, how can it be possible to prevent a similar fire from happening again? Whether natural, unknown, accidental or incendiary, all fires need to be investigated. Working together and making continued improvements in the field of fire safety and prevention is our surest path to protecting our families and communities from one of the most destructive forces on earth...fire.



Old Style Beer Salutes Chicago Heroes with Commemorative Can

After a successful debut last fall, Old Style will salute Chicago's heroes once again with the limited-release commemorative can. Old Style is proud to support those who heroically defend this great city and their families. Proceeds from each case sold will benefit Ende, Menzer, Walsh and Quinn (EMWQ) Retirees', Widows' and Children's Assistance Fund, a local organization that provides annual financial assistance to the neediest widows and orphans of members of the Chicago Fire Department.

This is the second year of the commemorative can, after having a successful debut last fall for a limited-time only and becoming an instant collectable



Image courtesy of Old Style

for Chicagoans, Old Style enthusiasts and those who work for or honor the Chicago Fire Department. New this year, the limited run (July through early September or while supplies last) commemorative can will now be available in 24-packs, 12-packs and 16 ounce cans, with Old Style donating a minimum of \$10,000 and up to \$20,000 to the organization.

Old Style has a long and storied history with the city of Chicago. Showing its dedication to the community that has generously supported the brand throughout the years, Old Style launched the Chicago Heroes program to pay tribute to the hard-working men and women who keep Chicago safe and protected every day. The commemorative can, adorned with an image of a firefighter and details about the organization, is available at retailers throughout Chicagoland.

"When we launched the Chicago Heroes program last year, it was a unique way for us to pay tribute to the everyday heroes who don't get thanked enough for all of their courageous work," said Dan McHugh, CMO for Pabst Brewing Co. "We selected EMWQ Assistance Fund as our partner for this initiative because we've been so impressed with their work and the tremendous support they

provide to Chicago firefighters and their families. The funds raised from last year's commemorative can made a significant impact on those who received donations, and it's such an honor that we can do something truly meaningful. We look forward to re-launching the can, and once again seeing Chicagoans embrace it and the cause."

The final donation from last year's limited run went on to assist several Chicagoland families, helping those who received contributions put money toward their children's education, pay off outstanding bills, and in general continue to be able to afford day-to-day necessities. This year, Old Style hopes to help even more families with the program expanding to the 12- and 24-pack Old Style 12 oz. cases.

"We are very grateful to Old Style for their salute to men and women of the Chicago Fire Department," said Lt. Anthony Martin, President of the EMWQ Fund. "On behalf of the families we serve, I'd like to thank Old Style for its continued generosity, reminding our widows and children that the community remembers and honors the service of their loved ones."



For more information, go to
www.widowsandchildren.org

Leader Develop the BATfan

LEADER continues to be a major player in the PPV world having recently developed the BATfan. The BATfan is powerful and light weight for completely self-contained operation which allows fast implementation and maximum flexibility during response, while requiring little storage space.

There are two versions available; BATfan with a 20-minute runtime weighing 23.5 kg and BATfan 45-minute weighing 27.5 kg. Both models can also run on mains electricity if required.

The BATfan is both compact and mobile, it folds up and stows easily in the trunk of a vehicle. Two BATfans can fit in the space of one conventional fan! It is quicker to set up than conventional fans as there is no time wasted searching for a power socket!

BATfan is multi-functional equipment for PPV attack, PPV combined ventilation, etc.



For more information, go to
www.leader-group.eu



Image courtesy of Leader Group



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The New Carmichael Cobra 3 Airport Firefighting and Rescue Vehicle

The United Kingdom's most diverse manufacturer of firefighting and rescue vehicles Amdac Carmichael Limited was established from humble beginnings in Worcester (UK) in 1849. In 1947 it supplied its first fire-engine and under the leadership of various international companies Carmichael has established itself as a major force in the manufacture,

supply and support of firefighting and crash rescue vehicles world-wide. Today the company continues to boast worldwide sales with its core fire-engine design, research and manufacturing facilities remaining in the City of Worcester UK.

Carmichael supplied their first major airport crash tender in 1962 and they have been at the forefront of ARFF vehicle

design for over 50 years. For 30 years it used Jet Ranger as its ARFF vehicle brand but In 1992 it dropped the name with the introduction of a new range of airport firefighting vehicles each with a separate trading name: the 4x4 Condor, the 6x6 Cobra and the 8x8 Cougar.

Carmichael first introduced the prototype Cobra airport rescue and firefighting vehicle in 1992. Built exclusively on a Unipower RE6P 6x6 airfield firefighting vehicle chassis the prototype delivered to Glasgow Airport featured a unique Carmichael crew cab manufactured in steel which was superseded by a clean flowing purpose built crew safety cab design with wide opening doors; a modular steel and GRP top deck hamper, easy engine access and integrated high level emergency warning lights. The Cobra airport rescue and firefighting vehicle saw success in the UK, North Africa and the Middle East.

Building on the success of the Cobra 6x6 concept, in 1998 Carmichael launched the Cobra 2 which was available in 4x4, 6x6 and 8x8 configurations. The Cobra 2 introduced a new standard in crash tender design with its large crew safety cab, wide opening doors, low step entry, flat floor and multiple seating options. The Cobra 2 offered a variety of base chassis options which included the low profile Carmichael Cobra C2 chassis; plus a vast array of chassis options to meet individual customer specific requirements. The custom built Cobra C2 chassis available in 4x4, 6x6 and 8x8 configuration permitted individually tailored tenders with wide bodied options, extended wheel bases and a twin engines. It comes as no surprise to learn that the Cobra 2 went on to establish itself as one of the most successful airport crash tender designs of the 21st century with deliveries to date exceeding 120 units to customers as widespread as China, Kazakhstan and the Caribbean.

Carmichael chose the prestigious Interschutz 2015 international trade fair for fire prevention, protection, rescue and safety in Hannover Germany to show-

▼ The new Amdac Carmichael Cobra 3 featuring the new Carmichael Jetranger high reach extendable turret seen here in the high attack position.



Image courtesy of Gary Parkinson



Images courtesy of Gary Parkinson

▲ The stunning clean lines of the prototype Amdac Carmichael Cobra 3 (above) and in the 'attack' position (right).

case their stunning all new aerodynamic Cobra 3 major aerodrome firefighting and crash rescue vehicle. This prototype of the third generation of the Cobra ARFF vehicle has recently completed an extensive period of proof testing in the United Kingdom and is now being marketed in 4x4, 6x6 and 8x8 configuration. This stunning example of British fire-engineering is based on an all new purpose built Carmichael 6x6 low profile chassis, incorporating a Volvo Penta Euro 5 diesel engine, Twin Disc automatic transmission and ABS disc brakes. The Cobra 3 features this stunning and extremely spacious air-conditioned crew safety cab design approved to UNECE R29 standard. It has an unrestricted interior, flat floor and a light and airy interior. The large hinged crew cab doors and pneumatically operated steps permit easy crew access with various seating configurations for a driver and up to 5 crew plus sliding roof hatch access to the top deck. The British built top-hamper manufactured in polypropylene with GRP profiles has integral tanks carrying up to 12,000 litres of water and 1,700 litres of foam. The Cobra 3 can accommodate up to four spacious and useable lockers per



side in a variety of layouts enclosed via a combination of either roller shutters, hinged or pantograph locker doors plus fixed or demountable dry chemical powder systems. The 3 continues to boasts easy engine access, an important feature for scheduled maintenance. The prototype illustrated has a GVW of 36,000 kg and acceleration of 0-80 kph within 30 seconds. The new 3 comes with a long list of chassis and fire engineering options including wide bodied, short width, extended wheel base and twin engine – to meet all customer requirements.

Another first for Carmichael at

Interschutz 2015 was the launch of the British designed and manufactured High Reach Extendable Turret (HRET) as fitted to the prototype Cobra 3. The Jet Ranger resurrects a brand name formerly used by the company for all its major airport fire tender products. The Jet Ranger has a working height of 15.24 metres, reach of 11.40 metres and a monitor capable of delivering 6,000 lpm in the stowed position and 3,785 litres per minute deployed. A 20 metre option is also available.



For more information, go to
www.amdac-carmichael.com

PATeye Technology from Solarbright helps Combat Black Ice Danger

As if their job wasn't dangerous enough, during the winter months many firefighters around the world have to contend with the dangers of black ice at their own station-houses BEFORE answering emergency calls.

Areas of black ice can pose a real danger to firefighting crews as they rush to respond, especially on cold, dark winter nights. In an effort to help minimise this risk to their firefighters the New Zealand Fire Service have been installing a unique and innovative ice warning device at a number of their sites throughout the country's South Island.

The New Zealand Fire Services' interest in the product came as a result of a donation of several ice-detecting pavement markers made to a local station by the device's manufacturer, SolarBright Limited, after a member of their staff had to call on emergency services late one night. Following an off the cuff remark by a first responder, and a couple of in-house "water-cooler" meetings, the SolarBright team decided that the company would offer to donate

and install their award-winning PATeye at the ice-prone station as a small token of appreciation and as a way of helping the community-based fire crews avoid slips and falls caused by black ice.

The PATeye is a self-contained solar-powered reflective marker and warning system that is triggered when ground temperature and moisture levels indicate the very high likelihood of ice formation, illuminating the road/pavement and drawing attention to hidden patches of 'black ice'. Once triggered the onboard LEDs flash blue and provide an active, real-time warning alerting to the high probability of surface ice.

PATeye is ideal for walkways, steps, paving areas, car parks and general access areas in and around any premises, wherever ice may be present. In addition to providing an active warning to personnel on foot, the flashing PATeye also serves as an indication of the road conditions that drivers are likely to find on the roads leaving the station thereby further enhancing the safety of both fire crews and the public.

The initial install was soon followed by several enquiries and orders from individual regional stations and it wasn't long before Solarbright were approached by the New Zealand Fire Service (NZFS) with a view to rolling out the PATeye across all their ice-affected properties.

As a result of these conversations NZFS are now starting an installation programme which, beginning with their 24

hour-manned "Career Stations" in and around Canterbury, will ultimately see the deployment of the award-winning PATeye at all South Island NZFS facilities which are prone to the formation of black ice.

Commenting on the NZFS adoption of the PATeye as a health and safety tool at their stations Nicola Martin, SolarBright's MD said "It's fantastic for us to be able to work with and help the NZFS in protecting their crews from the hazards of black ice at their stations, after all, their work is dangerous and difficult enough on a bright sunny day let alone in the middle of a cold winter's night. It's also nice to see that the idea of "paying forward" to the brave men and women of our local emergency services has had such a great, and unexpected, outcome for our business".

The PATeye is proving to be a valuable Health and Safety asset across all sectors of the emergency services in New Zealand and is now used, not only by the Fire Service, but also by the New Zealand Police Service and the New Zealand Defence Force to help protect their personnel, visitors and contractors from the risks of slips, falls and personal injury caused by ice at their facilities.

The PATeye is manufactured and patented world-wide by Solarbright Limited.

 For more information, go to www.solarbright.co.nz



Image courtesy of SolarBright Limited

UK First for Blackpool Airport

Blackpool Airport Fire Service has received the first Iturri Group Isuzu D-Max 4x4 Civil Aviation Authority Cat 2 rapid intervention vehicle supplied within the United Kingdom.

This clean flowing light airport fire tender features:

- 2.5 litre diesel engine,
- Two man King Cab with rear half doors accessing additional stowage space;

- A one piece Ecopolyfire polypropylene body with a three locker configuration
- 700 litre integrated water tank;
- 42 litre integrated foam tank;
- Rear mounted Hale HPX100B18 pump.

The body has ample shelved stowage space and an upgraded rear suspension approved by Isuzu UK. An identical Isuzu D-Max 4x4/Iturri RIV is also operational at Lee-on-Solent Airport in Hampshire.



Image courtesy of Nigel Crosswell - Iturri

 For more information, go to www.iturri.com

Sishen Mine's one-of-a-kind Firefighting Vehicle

Following an extensive planning and execution period Cobra Petro Projects of Johannesburg in South Africa have delivered this 'one-of-a-kind' mine firefighting vehicle to Kumba Iron Ore's Sishen Mine in the Western Cape.

This state of the art firefighting and aerial rescue vehicle was specifically designed for the mining industry by a working group consisting of Sishen Iron Ore, Barloworld; Cobra Petro Projects; Fire Raiders (Pty) Limited and Bronto Skylift Oy Ab – under the project leadership of Scharika Ludk (photographed).



Image courtesy of Cobra Petro Projects

This unique firefighting vehicle is based on a Caterpillar 740 Articulated Dump Truck chassis (CAT 740 ADT) which is ideally suited for the rugged environment in which it will operate. This 6x6 chassis features a CAT C15 ACERT 361kw diesel engine, a 7 speed manual gearbox and a cab for a driver and one crew member. The specially shaped body with its integrated water tank carries 23,000 litres of water and is recessed to permit the 28 metre Bronto Skylift F28 ALR aerial ladder platform to snugly stow between.

The fire truck also features a front mounted bump-bar and electric winch, two generous equipment lockers, a rear mounted 5kVA generator, two stabilisation jacks per side, AFFF foam induction plus three firefighting monitors which can be operated by remote control.



For more information, go to
www.cobraprojects.com

FireStorm for Melbourne

Melbourne Fire Brigade (MFB), Australia has recently taken delivery of their new FireStorm 40 from MetalCraft Marine (MCM). MFB has unveiled the newest member of its marine fleet – Fireboat 2 – a world-class, firefighting vessel that will protect Melbourne's waterways and marinas.

Measuring 12 metres long, the water-jet powered craft, christened Prometheus, was purpose-built in Canada and can travel at speeds in excess of 34 knots.

With an innovative style MCM creates one of the World's fastest and highest pumping fire/rescue boats. Essentially the boat is equipped to fight ship board fires, as well as used as a fire hydrant (non-stop water supply) for shore based fires. The boat is also equipped with EMS stations along with equipment for dive recovery operations.

Model:	FireStorm 40
Hull Number:	597
Displacement:	35,600lbs
Horsepower:	Twin 610hp
Speed:	34kts
Jets:	(2) Hamilton 322
Fire Pump:	(2) Darley 1750gpm
Engines:	(2) Cummins 11L@610hp



For more information, go to
www.metalcraftmarine.com



Image courtesy of MetalCraft Marine



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The BADAXX

Innovation Ensures the Advancement of Fire and Rescue Service

It seems almost every aspect of this industry has kept pace with changing technology, from breathing apparatus and bunker gear, to communication equipment and incident management systems. But what about the most common tools we depend on? Firefighters have used the same traditional axe design for over 150 years. It is time for a new tradition!

The BADAXX was created by Scott McCann, a Fire Lieutenant with the Spokane Fire Department for the past 23 years. McCann saw the need to lighten his load by combining multiple tools into one. "I had been contemplating redesigning the fire axe for a few years," said McCann, "I have always struggled with which hand tool to take to the roof with me in emergency situations. I liked the pick head axe to provide an extra foothold but the blade has a tendency to become pinched when set into building materials. For years, we have taught

▼ Beautiful machined finish with seven color options.

firefighters to use the back side of a flat head axe to eliminate the struggle of a pinched blade. There had to be a way to incorporate both the pick and the blunt face into a single axe head. Once my department purchased the bailout kits, I decided it was time to design something that had all of these features and included a solid bailout anchor point in case I needed to rappel to safety."

Like most good ideas, it took a significant amount of capital to get the BADAXX from a concept to production. McCann turned to "crowd funding" via kickstarter.com and raised 150% of the necessary funding needed to begin production. Many other first responders rallied behind McCann's idea as they too saw a need for innovation to help take their equipment to the next level.

Like most fire axes on the market today, the BADAXX weighs 8 Lbs. but the similarities end there. The head is designed with a pick on one end and the blunt face on the other. The pick is designed to provide a good solid set and not wobble loose like other pick head axes. Set at an angle,



Images courtesy of BADAXX

▲ Marries tight to a halligan style bar, fits up to a 3" adz blade.

the pick can also be used for lifting and prying. On the other side is a flat surface for striking, making it an ideal tool for forcible entry when paired with a halligan style bar. The rectangular hole in the side of the head receives the adz blade of a halligan style bar, allowing the handles to mate closer than any other tool currently on the market. The striking surface is flanked by two beveled edges that aid in "chopping" while preventing the blade from becoming pinched. Other features include a notch for gas line shut off and knurling on the top of the axe head to increase traction when used as a foothold and to prevent the tool from slipping when forcing doors. The beard of the BADAXX head is made to create a rock solid bailout anchor for rappelling.

The handle is precision machined from aerospace-grade billet aluminum, and is both beautiful and functional. The ergonomic design makes for a well-balanced and easily manipulated tool. Incorporated features include; two styles of hydrant wrenches, a notch to receive the optional carrying strap, and a rope/hook attachment point at the end. The BADAXX is also offered in a number of custom anodized colors.

We look forward to seeing the BADAXX perform and believe this is one tool that will stand the test of time.



▼ For more information, go to www.thebadaxx.com



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FlareAlert Introduces Emergency Beacon

Designed for professional firefighters, law enforcement, and military, as well as personal emergency use. Unlike incendiary strike flares, FlareAlert LED Beacons are personally and environmentally safe to use. No more risk of inhaling toxic fumes, starting brush fires, igniting spilled fuel/oil, or burning equipment or yourself.

FlareAlert's Large Bag Public Safety Emergency Kit comes with either 4, 6 or 8 beacons in the colors of your choice, 8 Cone Adaptors (for beacon placement atop traffic cones), 8 Weighted Bases (anchors beacon in high winds or helicopter landing), and 32 AA batteries. Additionally, the Cone Adaptor and Weighted Base can be threaded together to make a Ground Stand. The large storage bag pockets keep your

Beacons and accessories separated, keeping your kit organized.

The Small Bag Roadside Kit is FlareAlert's more basic roadside kit. The kit bag is designed to hold 3 Beacon/Beacon Pros and 12 AA batteries. The Small Storage Bag contains 3 separate pockets that neatly hold the lights securely in place.

The FlareAlert LED Beacon Flare Kits are the perfect size for every public safety vehicle's trunk, motorcycle patrol or personal use. The FlareAlert is lightweight and compact leaving your trunk more space for additional important equipment.

FlareAlert's Beacon and Beacon Pro contain 2 modes: flash and steady. These modes can be controlled by a small power button located on top of the light. These LED road flares are very tough and durable. They can withstand the weight of a 20,000 lbs. vehicle! With the Beacon and Beacon Pro's rounded edges and low profile, a vehicle running over the light will not be a problem. Each Beacon has a magnetic base, making it easy to securely mount to a vehicle, metal object, or the included ground stand for increased visibility. The 4 rubber feet on the Beacon prevent vehicle scratching.

FlareAlert's LED road flares have a few



Images courtesy of FlareAlert

lens color options. The standard Beacon has two (2) color options: Red (Red Beacon-RB.2) and Yellow (Yellow Beacon-YB.2). The brighter version, or the Beacon Pro, has 5 color options available: Red (Red Beacon Pro-RBP.2), Yellow (Yellow Beacon Pro-YBP.2), Blue (Blue Beacon Pro-BBP.2), Green (Green Beacon Pro-GBP.2), and White (White Beacon Pro-WBP.2). FlareAlert's various lens options allow the user to have the appropriate colored flare depending on the situation at hand.

Simply twist open to install/change batteries and twist to close. Just put it down and turn it on. No tools necessary.



For more information, go to
www.flarealert.com



Technology Update: Drones

Unmanned Aerial Vehicles are becoming increasingly popular for a range of industries, with everyone from construction to agriculture wrestling to get their hands on the technology. However, with UAVs yet to fully make the transition into the fire service, does the technology have a future within the sector?

The benefits of using UAVs within the fire service are becoming increasingly evident. UAVs add vital intelligence to situational awareness of incidents, serving as both a safety and a communication tool. Quick and easy to deploy, able to assess large areas in a very short period of time and relay real-time footage, UAVs can provide critical information to the team on the ground and facilitate an assessment of the entire incident area. UAVs can thus play a key role in determining the course

of action taken and improve the safety of personnel by enabling potential hazard identification before they enter a site. The array of sensors that can be fitted to UAV platforms, including visible light and infrared, mean that the technology can also aid informed decision making for a range of incidents such as forest and wildfires, search and rescue, chemical spills and large-scale industrial fires. Aside from initially assessing a site upon arrival, UAVs can also be used to monitor live progress of an incident as it develops, enabling continual assessment of fire movement, alerting personnel when conditions change and aiding evacuation decisions.

With UAVs designed specifically for the fire service coming onto the market the technology is certainly one to watch over the coming year. For more information

about utilizing UAVs within the fire service visit SkyTech 2016, a UAV conference and exhibition showcasing the latest innovations and applications in drone technology, taking place 27th and 28th January 2016.



For more information, go to
www.skytechevent.com



Image courtesy of SkyTech

Hammond Drysuits supply to UK Fire Services

Hammond Drysuits has supplied further SR140R drysuits to the Fire and Rescue Services in the UK.

The SR140R drysuit is part of the commercial search and rescue range from Hammond Drysuits. The fire services use the suits for water safety call outs. The wearers can be in the water for prolonged periods of time and the suits keep them warm and dry, which can help maintain their focus and concentration. For this reason, the suit itself is robust and hard-wearing and designed to stand up to extreme varying situations faced by the fire services on a daily basis.

Made of durable Nylon N140, all the seams are single stitched and hand tapered for a longer lasting watertight seam. The seat, knee and shin areas include a double layer of material aiding longevity in these sections that are prone to more abrasion than others.

All suits are made to order with the option, like the fire services, of having the suit made to measure rather than a standard size. In addition to achieving the ultimate in comfort and protection, the made to measure suit comes with optional extras such as neoprene seals, braces, and Bekina® safety boots.

The fire and rescue services opted for a rear zip, which goes just across the shoulder blades, this allows greater manoeuvrability and does not cause any discomfort across the chest area or restrict movement when potentially in tight search and rescue situations.

"We supply our suits for a number of different purposes and uses. Suits such as these for the fire services are particularly bespoke as comfort and performance are vitally important." Commented Chris Hammond, Managing Director at Hammond Drysuits. "We have a good relationship with a number of different regions within the services and we are delighted they are happy with our product and service and that they continue to use us."

In addition to providing the new bespoke suits for the service, Hammond Drysuits carry out repair work as and when required to make sure the suits maintain their robustness and remain watertight for when they are next required.



Image courtesy of Hammond Drysuits



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For more information, go to

www.hammond-drysuits.co.uk/search-rescue-dry-suits.html

Krusepak

Innovative and Proactive in Increasing Firefighter Safety

The fire service has always prided itself on attempting to be proactive versus reactive. So many issues are still being evaluated and trained on that sometimes it seems impossible to remember everything. One of the areas that we must continue to be proactive in the fire service is staging equipment for the prolonged incident. That is why the KrusePak was created.

The KrusePak is an innovative, patent pending piece of firefighting equipment, or essentially a transport sling, for SCBA air tanks and various small tools used in the fire service. Although it was originally created to assist specifically in high rise fires, the Krusepak has expanded its usage to residential, commercial, rural and industrial fires, extrication, water rescue, technical rescue, haz-mat and various other emergency operations. The Krusepak allows each firefighter the ability to carry two spare SCBA bottles and other various small tools completely hands free.

Depending on each individual's strength, comfort and/or preference, it may be carried several ways – hung over your air pack, on your shoulder, or cross-body to distribute weight most evenly. All methods offer hands-free movement for easy spare bottle transport and increased safety for the firefighter. The KrusePak is highly durable, water resistant and boasts a handle, padded strap, grommets to attach various tools by use of carabineers and two pockets for small rescue tools such as



▲ The KrusePak can be utilized in multiple operations on the fire ground including Rescue/Extrication operations when utilizing air bags or an air chisel.

wedges, wire cutters, window punches, etc. Additionally, the KrusePak allows for easy identification of “full” bottles vs “empty” bottles while at the fire scenes resource/staging areas and also identifies each department/companies bottles in a mutual aid situation.

High rise incidents are probably one of the most complex incidents we will face in the fire service. Carrying spare equipment to upper floors has always been a challenge. Placing two SCBA bottles in your KrusePak and carrying those bottles hands free will allow yourself to use the handrails if necessary when ascending the stairwell. Also, preloading your KrusePak pockets with chocks, spanner wrenches, sprinkler tongs or any other hand tools



▲ The KrusePak is also useful to clearly identify full vs empty bottles. Flipping bottles upside down will easily identify depletion of your resources.

will make you more proactive if the need for those tools should arise.

Although the KrusePak was initially designed to carry spare bottles to replace the ones we utilize in our air packs, the KrusePak can also be utilized in incidents using air bags or air chisels. Carrying the bottles for these tools will also keep the bottles confined so they won't roll around and also allows for quick deployment when the incident you may be using these tools are off the roadway and a distance from your apparatus. Again utilizing the grommets, and carrying your spare hose and regulator for your air bags or chisel will allow you to carry everything you need for this incident in one complete pack.

Haz-mat, technical rescue, rural fires, commercial/industrial fires and even residential house fires are all incidents where your apparatus can't always be parked next to the incident. Hauling spare equipment to your incident, specifically spare SCBA bottles, is not easy and is sometimes not even being done. Utilizing the KrusePak will make your department more proactive by hauling your necessary equipment closer to the incident and staging that equipment ready for deployment or replenishment.



For more information, go to www.krusepak.com

Where **collaboration** meets **innovation**



THE EMERGENCY SERVICES SHOW

NEC | BIRMINGHAM | 23-24 SEPTEMBER 2015

A unique event for anyone who works in the emergency services

Come along to the Show on 23rd and 24th September at the NEC, Birmingham to:

- See and handle the latest equipment, kit, vehicles and technology
- Receive training in the latest rescue and lifesaving techniques
- Network with other blue light services and rescue organisations
- Gain a deeper understanding of the support available from voluntary sector partners

Free seminars include

- The WMFS R&D Team discuss 'Bluelighthinking' and the future for multi-agency interoperable firefighters
- Peter O'Reilly, Greater Manchester FRS discusses the Community Risk Intervention Team
- Operational teams will present an overview of the multi-agency response to the Alton Towers incident
- Matt Wroughton and his team from WMFS talk about the use of drones in response incidents and body worn video use
- Lincolnshire FRS, EMAS and LIVES present their experiences of the Joint Ambulance Conveyance Project – Fire Ambulances – Is now the time?

Register for free entry today at www.emergencyuk.com

IF YOU HELP OTHERS IN AN EMERGENCY YOU SHOULD BE AT THE EMERGENCY SERVICES SHOW

Thanks to our Show supporters



Future of Fire & Rescue Showcased at the Emergency Services Show

See the latest firefighting technology and hear examples of successful multi-agency working from the UK's most forward-thinking fire and rescue services by visiting The Emergency Services Show this year. Taking place at the NEC in Birmingham, UK on 23rd and 24th September, this free event is open to all ranks throughout the fire and rescue service and industrial brigades, including overseas visitors.

Source New and Innovative Equipment

Featuring over 400 companies and organisations, the impressive indoor and outdoor exhibition is a one-stop shop for sourcing all the latest services and equipment required for fighting fires and keep the public safe from threats such as floods, road traffic accidents and terrorist attacks. Exhibiting companies include leading names in firefighting equipment, search and rescue, extrication, communications, IT, protective clothing and uniforms, outsourcing, training, community safety, station facilities, and water rescue.

Visitors with an interest in vehicles will find leading names such as Rosenbauer and Volvo Trucks, as well as Incident Command Units and welfare units, all types of in and on-vehicle ancillary equipment, including communications and IT, from providers like Primetech and Excelerate Technology. Exhibiting for the first time is NLG Wholesale, Europe's leading supplier of 4 X 4 accessories.

Other new exhibitors include Halo Thermal Imaging, International Safety Products and respiratory experts Sundström Safety.

Drones and Body Worn Video on the Agenda

This year's event will feature three seminar programmes covering training, innovation and collaboration. In the Innovation Theatre delegates can hear how West Midlands Fire Service has employed technological advancements such as Unmanned Aerial Vehicles (drones) and body worn video, and members of its team will lead a panel discussion on the future of multi-agency emergency response. Ben Clark, Inspector, Metropolitan Police Service will also talk about body worn video and discuss the implications for partner agencies.

Focus on Vital Role of Voluntary Sector

In an era of austerity cuts there has never been more reason to increase the dialogue and co-operation between the emergency services and the voluntary sector. British charity SARAIID for example has an international search and rescue team, which was deployed to the Nepal Earthquake this year. It will be exhibiting in the Emergency Response Zone alongside 80 other organisations which could support you in preparing for and responding to future incidents.

Update Your Skills

The Royal Life Saving Society will be holding a Throwline Challenge and a team of specialist firefighters will be demonstrating Safe Working at Height and rope rescue techniques on the Crofton Engineering training tower and confined space cage. Visitors can also speak to companies such as Serco about the international fire training courses they offer and Rescue 3 Europe training provider, Cardiff International White Water, about its Swift Water and Flood First Responder courses.

PPE: New Launches

Many protective clothing manufacturers and suppliers are launching new products at The Emergency Services Show.

Bollé Safety will be launching the new Backdraft heat resistant goggle while on show for the first time on the Vimpex stand will be the new F10 MKV and F15 firefighting helmets. Bennett Safetywear Ltd will launch the latest additions to its well-known Blazemaster range of structural firefighting gloves. MAGNUM will show the new Vulcan Pro fireboot, which weighs in at around 1kg per boot, whilst Skellerup Footwear will also display its range of rubber fire boots including the Firefighter Extreme. Ilasco with Keela will launch two new clothing ranges; the FR Range and the Water Rescue range, and UK-based Technical Absorbents Ltd (TAL) will officially launch its K-Sorb™ fabric. Meanwhile Bristol Uniforms will display new products including the company's layered PPE solution, LayerFlex™. Exhibiting at The Emergency Services show for the first time is Visijax which specialises in embedding washable electronics (LEDs, sensors, cameras and communications equipment) into clothing.

Getting There

The NEC is next to Birmingham International Station and Birmingham Airport and directly accessible from the UK motorway network. Entry and parking at The Emergency Services Show are free.



**For more information, go to
www.emergencyuk.com**



Image courtesy of the Emergency Services Show

PBI Performance Products

 Stand L5

PBI Performance Products protect thousands of firefighters around the world in Europe, Scandinavia, Australasia, USA and UK. They place their trust in PBI fabrics to deliver the necessary high performance that keeps them safe.

PBI fabrics are internationally renowned for their exceptional flame resistance and thermal protection from radiant heat, built on a 30-year heritage of technical excellence and innovation.

PBI will demonstrate the full range of its protective fabrics at Emergency Services Show this

year, including PBI Gold, PBI Matrix, PBI Max, Gemini XTL and Titan 1260.

The company's specialist 'next to skin' fabrics will also be on display. PBI TriGuard fabric delivers excellent protection against heat, flash fire and arc flash. PBI BaseGuard is a flame resistant, no melt, no drip economical moisture wicking base layer.

All PBI fabrics are lightweight and strong and achieve a high standard of flame resistance. They will not become brittle, shrink or break open when

exposed to flame and high temperatures. This also means that the integrity of the internal layers of the garment is protected and the transfer of any radiant heat is slower, allowing more time for firefighters to escape to safety in a situation such as a flashover.

The variety and flexibility of the PBI range is testament to their ability to create strong partnerships that result in products that meet the different needs of the end user.

 www.pbiproducs.com



Delta Fire

 Stand E38

Delta Fire, is delighted to announce their attendance at this year's Emergency Services Show. Coinciding with their 25 year anniversary Delta will be celebrating a quarter of a century in the fire industry.



Delta are proud to fly the flag for British Manufacturers and will be showcasing their highly acclaimed range of cutting-edge firefighting products now widely distributed across six continents.

Already the main provider of fire nozzles to professional firefighters in the UK, Delta's exemplary reputation in this field is well known. The Attack 100, 500 and 750 series of mainline nozzles represents state-of-the-art nozzle design incorporating computer aided design technology with high quality UK manufacturing.

The H500ST is now in service with many UK Fire & Rescue Services making it the number one hose reel nozzle in this sector. Combining automatic pressure and flow controls, through a hydro-dynamically assisted slide valve, provides for a low maintenance, high performance branch tried and tested in front line service over many years. Both Delta's mainline and hose reel nozzle ranges incorporate stainless steel spinning turbine teeth producing uniform, dense spray patterns with optimum droplet

size for efficient heat absorption. Delta will also be presenting their Specialist range of nozzles including the new Floor Below Nozzle, CAF branch, Shockless Nozzle, Smooth Bore and High Rise Nozzles plus an insight into the 'Generation 2' range of Fire Nozzles on the horizon at Delta in the near future. Delta will also be showcasing their highly acclaimed Fog Spike System, now adopted by a growing number of UK FRS as a staple in dealing with compartment fires.

 www.deltafire.co.uk

Ballyclare

 Stand J11

Visitors to Ballyclare's stand will be able to see a number of exciting products and developments covering the fire, police, prisons, ambulance and military sectors. 2015 has seen further growth and expansion for the company – new customers, new staff and a new, modern HQ in Stockport all form a great base for our exciting future expansion.

Of particular note is our newly-launched range of ambulance safetywear: a full ensemble of ambulance uniforms and workwear for paramedics and emergency workers. The

range is part of a layering system which means they are versatile, functional and durable. High visibility jackets and vests, shirts, fleeces and trousers provide a uniform range that keeps employees safe and protected at work and enables them to present a consistent image.

Visitors will also get the chance to discuss our managed services offering, encompassing garment supply, leasing, repair and laundering as we will have our specialist partner Berendsen on hand to explain the process in detail.

Ballyclare supplies the Ministry of Defence with highly complex aircrew flying suits, the Ministry of Justice with public order suits for the prison service and the police with a range of technical PPE, clothing, hi-vis flame-retardant vests and public order garments. It also supplies hi-vis technical clothing to the rail, aggregates and highways sectors and is one of the main suppliers of structural firefighting and rescue kit to the UK fire service.

 www.ballyclarelimited.com



Armadillo Merino

Stand L12

The clothes you wear may be slowly poisoning you. Your skin is the body's largest organ and is a vital protective barrier against the environment while also cleansing your body of certain wastes but it needs protection.

Petro-chemical based clothing (synthetics) are manufactured using thousands of synthetic chemicals and with specialist finishes for flame resistance, insect repellency, shrink resistance, easy iron and water repellency. It has been proven that the chemicals

associated with synthetic clothing are readily absorbed through the skin, avoiding the liver before entering the bloodstream. When you are hot and sweating your pores open up making the skin even more receptive to chemical absorption. The build up of chemicals in the body especially the combination with other toxic chemicals can lead to minor and major health ailments.

How to protect yourself?

Your first line of defense is your choice of next-to-skin clothing.

With better protection from the "inside-out" you can start to defend yourself from developing short and long-term health issues.

Armadillo Merino® specializes in next-to-skin protective clothing. The range of head to toe clothing creates a natural buffer zone around your body allowing the skin to function naturally, keeping you cooler in summer and warmer in winter – 'Saving your skin.'

www.armadillomerino.com



Scott Safety

Stand H32

Scott Safety, a global leader in the design, manufacture and supply of respiratory protective equipment, gas detection and thermal imaging technology, will be on Stand H32 at this year's



Show, demonstrating how it meets today's firefighting needs. With over one million firefighters across the world trusting in Scott Safety's products, the company has developed a portfolio of innovative and reliable products that will reduce user burden and incorporate real-time telemetry, situational intelligence and communications in hazardous environments.

With the recent acquisition of two companies whose design, technology and product creation capabilities complement and enhance Scott's existing

product range – thermal imaging company ISG and gas detection specialist IST Group – innovation will be very much on show

As well as demonstrating the Propak Self Contained Breathing Apparatus (SCBA) range, which offers one of the highest levels of respiratory protection and comfort available, Scott Safety will also be showcasing some highly anticipated new products:

- The innovative 379 Bar cylinder, which provides 25% more air in situations when you need it most.

- An exciting new range of portable gas detection products from GMI and Oldham (part of the IST Group), which provide greater accuracy, portability and adaptability in hazardous environments.
- The X380N thermal imager with ISG Technology – the world's only camera with hot-spot and cold-spot tracking – enabling firefighters to obtain better situational awareness in a fire scene.

www.scottsafety.com

Red One

Stand M40

The importance of regular, professional, experiential fire and rescue training for fire and rescue service staff and industrial fire teams should never be under-estimated. Only through consistent, thorough and accredited training, delivered by experts in each discipline, can the safety, security and competence of emergency services staff be assured.

Red One is the UK's leading fire and rescue training provider. Our success is based upon the fact that our training is delivered

by our expert practitioners, fire officers and firefighters with current experience and the highest qualifications who regularly attend real emergency incidents.

Our training is always immersive and experiential, meaning that for example, unlike other providers; we don't use gas in our fire training. We train using carbonaceous burns, as this is the only way that our students can truly experience the heat, smoke, flame and noise of an actual fire. We believe that your training experience should

realistically reflect what you are likely to face in real life, so that you are ready and prepared.


Based in Exeter, Devon and with additional training centres in Plymouth and Taunton, Red One offers more than 130 different courses covering all aspects of fire, rescue and safety and is constantly innovating new techniques for training delivery to meet changing operational standards and to ensure that students remain compliant, competent and confident.

www.red1ltd.com



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PBI Around The World!



Every day, firefighters around the world risk their lives to protect the property and lives of others. As these brave men and women place their lives in harm's way, PBI fibres play an integral role in firefighter safety. High performance outer shell fabrics with PBI fibres provide essential protection from heat and flame. PBI outer shell fabrics are EN and NFPA approved, and will not shrink or become brittle when exposed to high temperatures. PBI fabrics deliver high levels of comfort and durability. Choose from PBI Gold®, PBI Matrix® or our newest arrival, PBI Max™. For detailed technical information regarding PBI products, contact us directly at international@pbiproducs.com.

PBI Gold PBI Matrix PBI TRIGUARD PBI BaseGuard



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Fireblast Global

Stand B31

For nearly two decades, Fireblast Global has specialized in the design and production of fire training equipment for the Civil Aviation, Municipal, Oil and Gas, Industrial, Institutional, and Civil Defense sectors. Utilizing staff engineers experienced in worldwide projects, inclusive of architectural design and facilities engineering, our staff designs, engineers, manufactures, and supports the broadest range of fire training products available today. Our goal is to be the

first choice for customers, by developing training equipment that is recognized for quality and performance, and to produce fire training products that set industry standards for safety.

At Fireblast Global, our commitment to Innovation is reflected in each and every installation, exceeding customer expectations by delivering the most realistic and technically advanced training environments available. We believe the design of outstanding training equipment, with proven reliability, backed by top-rated

product support, gives "value" a whole new meaning – and year after year our customers agree. Our recently introduced Quick-Burner™ technology is revolutionizing the fire training

systems industry, delivering a system design that is designed for maintenance and provided unparalleled system reliability.

www.fireblast.com



Holmatro

Stand M62, OS449

Come and see the new range of Holmatro 5000 Series Cutters and Spreaders on stand M62.



New 5000 Series Cutters

The most important factors in the development of these cutters were weight reduction and improved ergonomics, while maintaining an optimal cutting performance on modern cars. This has been achieved through a combination of new materials, component integration and innovative design. Being much lighter than the previous generation, the new 5000 series cutters significantly reduce the physical burden on the operator. All models are available with Greenline battery technology.

Inclined Cutter

The burden is even further reduced by one special model, the Inclined Cutter. Designed for more ergonomic cutting high and low on the car, this cutter with its inclined jaw eliminates the need to lift the tool high up for a roof cut or to bend over deeply to cut the rocker panel. Working with the Inclined Cutter also means there's more space for the tool to move towards the car when you cut a pillar from the side. The CU 5050 i too has been tested extensively on the latest vehicles.

New 5000 Series Spreaders

The most important factor in the development of this series was weight reduction, without compromising spreading force and spreading distance. This has been achieved through a combination of new materials, component integration and innovative design. The result is five new spreaders with an outstanding performance-to-weight ratio that significantly reduce the physical burden on the operator.

www.holmatro.com

FireWare

Stand OS03

At FireWare it is all about creating realistic training environments.

We enable emergency response teams all over the world to train as realistically as possible. Stimulating as many senses as possible from our technical theatre origins differentiates us from others. This is how we help emergency response team members to become and stay professionally skilled. We combine creativity with proven techniques and come up with innovative solutions which make all the difference in the training experience.

Our FireSales products fit seamlessly with the manikin range from Ruth Lee. This synergy makes Ruth Lee our perfect distributor for the United Kingdom and Ireland. FireWare itself is based in the Netherlands.

Please let us welcome you at our booth OS03. We are outside and love to demonstrate to you:

- Different smoke generators Cirrus, Cumulus, Stratus and Nimbo;
- Tango Safety software;
- Neptune practice extinguisher refilling system;

- Vesta Fire trainer series;
- Sound effects;
- Smell effects
- Mini PPV trainer;
- Easy package and storage solutions.
- And much more.

Curious about how we can help you with your training issues? Find more inspiration in realized projects, information about design of training facilities or our product range on our websites.

www.fireware.nl
www.ruthlee.co.uk



Sky-Futures



Sky-Futures, the global Unmanned Aerial Vehicle (UAV) inspection specialists for the Oil and Gas industry, have launched the new Sky-Futures Training Academy



offering UAV training to the Rescue, Response and Resilience sector.

In partnership with Capita, the Sky-Futures Training Academy is based at the Fire Service College, Gloucestershire which provides a realistic training environment. This CAA approved UAV training is conducted on a large controlled site which offers a variety of operational scenarios designed specifically for Emergency Services. Basic, Intermediate and Advanced courses will train Remote Pilots to fly safely, procedurally and

competently in operational environments.

UAV training is delivered by Sky-Futures highly experienced Remote Pilot Instructors who maintain their currency through 8,500 hours of operational and commercial UAV flying experience offshore, in some of the most demanding conditions. Specialist Sky-Futures staff from the Emergency Services sector ensure that the courses are suitably tailored, relevant and demanding.

David Hunkin, Sky-Futures Operations Director commented:

'Sky-Futures clients believe that UAV operations should be approached with the same uncompromising manner to safety as response driving, firearms training and manned aviation. Located at a world-class emergency service training facility, we are delighted to be able to offer training to a level that has previously been unavailable in the market. Demand has been high and we are very much looking forward to delivering our first courses in September.'

www.sky-futures.com

Excelerate Technology



Excelerate Technology is the leading provider of data, video, voice and Internet via satellite and wireless solutions on board incident command vehicles and across incident grounds. At ESS 2015 we will be showcasing

our latest integrated resilient communications solutions.

See our satellite and wireless based communications technologies integrated into new generation command and control vehicles. NEW for ESS

2015 – for a fully immersive experience of our on-board integrated communications technology visit our virtual reality suite.

Take a look at our innovative Command Pod – a portable central communications hub, operating independently of a vehicle, enabling users to rapidly deploy a resilient data network for the transfer of data, video and voice to and from the incident ground. Also 'Reflex' – our rapid response resilient communications solution for first responders. This vehicle

mounted communications pod allows personnel to access and share information in real time.

Learn more about the benefits of UAV's for achieving 360-degree aerial views at incidents and video streaming to required locations. We will also be demonstrating body-worn video, and 'Sherpa' – our automatic pole climbing camera and communications system providing a rapid deploy CCTV surveillance and data relay solution.

www.excelerate-group.com



Crofton Engineering



Crofton Engineering Ltd have been delivering training structures to the British Fire Service for more than 60 years, with their steel fire training towers and buildings in service at over 450 fire stations and training centres in the UK and abroad.

With the modern fire service operational activity developing towards USAR, SWAH and rope rescue work, in conjunction with brigades, Crofton has evolved bespoke training towers specifically designed to facilitate a variety of realistic rope rescue training scenarios.

At the 2015 Emergency Services Show, Crofton Engineering's prominent stand will feature a training tower with a sloping roof, a crane jib, and a confined space cage. During the Show a specialist team of experienced firefighters will demonstrate SWAH and rope rescue techniques to demonstrate the versatility of Crofton's cost-effective training structures.

In addition to supplying carbonaceous fire behaviour training units, Crofton Engineering can now also

offer LPG FBTU's that deliver a new standard of repeatable firefighter training experience and outcomes.

Leading the Crofton team on the stand will be Director Glen Godfrey, along with Wayne Porter (also a Director and ex-Lincolnshire FRS); Andy Barker (ex- Greater Manchester FRS); and former CFO Neil Wallington. Crofton's gas engineering partner company will also be present.

www.crofton-eng.co.uk



Floodsax

Stand G40

A pioneering sandless sandbag has proved itself in action with the emergency services worldwide. The innovative FloodSax has been deployed to stop raging torrents of water, soaked up fuel at road accidents, cleared up the mess inside flooded homes and businesses and has even mitigated the effects of a bomb blast.

FloodSax at first look like pillowcases and weigh just 200 grams (7 ounces) before they are activated. But simply add water and in around three minutes they expand to weigh 20 kilos (44lbs)

to become more effective than traditional sandbags.

A World War Two bomb was discovered in a London garden and taken to Clissold Park in Hackney to be blown up safely. The Metropolitan Police surrounded it with FloodSax to lessen the blast as a special gelling polymer inside the FloodSax helped to absorb the shrapnel generated by the explosion. The drama can now be seen on YouTube. FloodSax are now regularly used to surround suspect packages in public places.

FloodSax were used to protect homes in the USA when it was battered by a hurricane and also saved countless thousands of dollars in damage when they soaked up a massive leak inside a hospital.

FloodSax are exceptionally space-saving to store and deploy. One box of 20 that can easily be carried by one person is equivalent to 20 sandbags on a pallet. Around two million FloodSax have now been sold worldwide.

www.floodsax.com



Dräger UK

Stand R37

Leading manufacturer in safety solutions, Dräger, is at this year's Emergency Services Show, so come and see us at

stand R37 to discover more about our innovative products and services.

We'll be showcasing

our expertise across the emergency services industry, with specialists on hand to discuss product features, service, training and maintenance options.

Visitors to our stand can look forward to seeing innovative breathing apparatus and mask communication technologies which ensure firefighters are protected and prepared for every situation they find themselves in.

Among the technology on display will be our new fire ground communications range of products, the Dräger FPR-

COM 5000, FPS-COM 7000, HPS 7000 firefighters' helmet and HPS 3500 tactical rescue helmet.

Visitors will also be able to see the PSS integrated safety belt for use in unstable environments or working at height, PSS 7000 breathing apparatus with telemetry, Merlin entry control board and FPS 7000 facemask.

There will also be hands-on demonstrations of Dräger applications during the two-day event.

www.draeger.com



Godiva

Stand F2

At this year's Emergency Services Show Godiva will be displaying their brand new vehicle pump, the KP pump.

The KP pump is an innovative new pump that covers the lower end of the pumping range. With the demand for smaller more cost effective fire appliances, Godiva considered the user requirements and set to designing a new pump for discharge flows of up to 1500 l/min at 10 bar. This being a Godiva pump, there is a single pressure version the KP1 1510, and a multi-pressure option the

KP2 1510, which will provide a high pressure discharge of 250 l/min at 40 bar, simultaneously with the low pressure discharge of 1500 l/min.

The multi-pressure version has inherited the unique Godiva design of two impellers on a single shaft, a design that always reduces space demands, and nowhere more significant than with the KP pump.

The KP single pressure pump is on average 40% smaller in cubic volume than the competition and the multi-pressure pump is on average

30% smaller in cubic volume than the comparable multi-pressure pumps. This frees up space on the vehicle to carry more equipment or reduce the overall payload of the vehicle.

Also on display the Godiva Powerflow 8/5 and 12/10 pumps, lightweight portables with a powerful performance.

Come and visit us on stand F2 and discuss the benefits of the KP and other pumps for your fire pump needs.

www.godiva.co.uk



Forget about cleaning, just breathe



TopClean M – Professional cleaning and disinfection of respiratory equipment



Bollé Safety

Stand G33

Bollé Safety revolutionizes eye protection with an innovation that exceeds the requirements of all international standards, especially the EN166 K (anti-scratch) and N (anti-fog) option. The new and exclusive anti-fog and anti-scratch Platinum coating is now available on the Rush+, Silium+, Slam+, Contour, Cobra (foam versions) IRI-s, B808 plus Atom, Tracker and Backdraft goggles. It also guarantees greater safety, reliability and comfort. This permanent coating on both sides of the

lens gives them a high resistance to scratching, to the most aggressive chemicals and delays the onset of fogging. In all circumstances and at all times the Platinum lens innovation guarantees your eyes improved protection. Unlike other manufacturers Bolle Safety apply the new Platinum coating to both sides of the lens providing even greater levels of protection.

Bolle Safety are also the first company in the world to supply all their polycarbonate



prescription lenses with the Platinum anti-scratch and anti-fog coating as standard and at no extra charge. With a wide range of styles, including the unique Contour prescription eyeshield, Bollé Safety have the answer to all your eye protection

requirements. Don't take our word for it, try them for yourself, visit us on stand G33 and claim your free pair of Platinum.

www.bolle-safety.com

www.bolle-tactical.com

National Chemical Emergency Centre (NCEC)

Stand R14

The Chief Fire Officer's Association (CFOA) has selected NCEC's Head of Emergency Response, Dan Haggarty, to help produce new national guidance for firefighters responding to incidents involving hazardous



materials. Dan Haggarty will join CFOA's project board and will draw on his experience working for Ricardo-AEA's National Chemical Emergency Centre (NCEC) to fulfil a governance role in preparation of in-depth advice on the risks associated with hazardous materials and how to respond to them during an emergency.

The work builds on the 24/7 emergency telephone advice that the NCEC provides to its clients around the world, enabling organisations to safely respond to chemical incidents and

provide accurate information to emergency services.

Dan Haggarty commented: "I'm very happy to be joining the project board for the National Operational Guidance Programme. NCEC is in a unique position to support the development of this advice thanks to our experience operating the UK's chemical emergency centre for over 40 years and our work globally, advising business and industry on chemical emergencies."

CFOA's hazardous materials guidance is expected

to be added to its National Operational Guidance Programme during 2016.

Dan and other members of the NCEC team will be available on stand R14 at the Emergency Services Show, providing information on Chemsafe – the 24/7/365 national advice service freely available to the emergency services in dealing with chemical incidents, and Chemdata – the industry leading hazardous chemical database.

www.the-ncec.com/emergency-response/

Kongsberg GeoAcoustics

Stand M37

Norfolk, UK based Kongsberg GeoAcoustics will be unveiling their latest Search and Rescue side scan system at the Emergency Services Show.

The side scan represents the very latest in technology aimed at finding recoverable submerged items. Its sonar technology operates at frequencies that enable high definition images to be captured and pinpointed using the built in satellite receiver.

The system has already been quickly snapped up by the Swiss police force for lake recovery

operations. Data courtesy of Kantonspolizei Zuerich

Here you can see a diver returning to the surface, after inspecting a boat wreck on the lake bed. The resolution of the data is sufficient that missing persons can easily be spotted.

The system is easy to deploy and light enough to be carried by one person and can be used on the smallest of vessels. It needs only a car battery for power and uses a laptop to display the data.

www.km.kongsberg.com



Bristol Uniforms

 Stand J3

Understanding, and meeting, the changing needs of customers drives Bristol's innovative approach to new product development. The focus this year will be on a number of major new products to come to market in 2015.

The completion of the mid-term Technical Refresh of the CPCC (Central PPE and Clothing Contract) sees the introduction of a new, comprehensive range of firefighter protective garments for structural, technical rescue and wildland use. The extension of the previous (ICP) range creates an ideal opportunity for fire and rescue services to consider taking advantage of this no tendering costs, no joining fees national PPE procurement scheme. It offers the most flexible range of procurement options

available by including Purchase Only (PO), Purchase Managed Service (PMS) and Fully Managed Service (FMS), the latter offering the full flexibility of a lease contract.

Other new products will be our layered PPE solution, LayerFlex™, in a range which now offers a number of variants including a yellow under jacket with navy outer jacket. Also new this year will be two alternative structural garment constructions incorporating Gore Parallon, which offers enhanced wicking and breathability combined with improved thermal performance. XFlex™ structural and RescueFlex™ USAR garments will also feature prominently.

 www.bristoluniforms.com

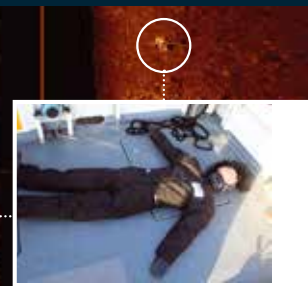
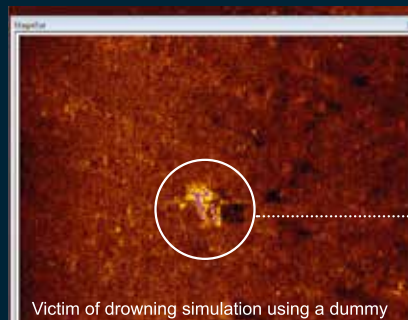


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Fire Apparatus Crashes Involving Firefighter Fatalities

Fire apparatus are designed to get equipment and firefighters safely to a blaze so that firefighters can help put out a fire and deal with other life-saving situations. While, according to National Fire protection Association (NFPA) statistics, fire apparatus crashed peaked in 2006, the fire service is still experiencing more than 12,000 vehicle crashes every year and this problem continues to cause many types of injuries, fatalities, and other problems.



William Peterson



Michael A. King

William Peterson is currently a Senior Vice President for Strategic Government Resources with lead executive search responsibilities for Fire, Emergency Medical, and Emergency Management related executive searches.

Michael King retired from the Ohio State Highway Patrol after twenty-five years of service. During his tenure with the Patrol, Michael received specialized training in traffic crash investigation/reconstruction.

Fire apparatus crashes also injure and kill passengers of other vehicles as well as pedestrians. They tap limited resources which need to be spent on emergencies. Worse, a fire apparatus that has been in an accident is slowed down, so that the persons waiting for a fire department response may suffer fatalities or serious injuries because a vehicle did not arrive in time. Each year, fire apparatus crashes also take many fire vehicles off the roads, stretching limited resources thin and making it harder for firefighters to respond to emergencies in a timely manner.

▼ On July 26, 2010, a 59-year-old male volunteer fire chief (victim 1) and a 67-year-old male volunteer firefighter (victim 2) died from injuries sustained after they were ejected when their engine was involved in a crash and rolled over.

Both volunteer and career fire departments in the United States have been experiencing fire apparatus crashes like these for many years. The NFPA has data that indicates that, between 1977 and 2013, 244 firefighters were killed in apparatus crashes (engine/pump, ladder, tanker, and ambulance/rescue) and between 1990 and 2013, 23,290 firefighters were injured.

The majority of fatal fire apparatus crashes, particularly in the last 15 years, were single-fatality incidents. The leading causes for these crashes are shown to consistently be:

- Excessive speed,
- Failure to stop at traffic control devices,
- Lack of caution at intersections.

Fire department vehicle operations that exhibit any of the above causes will, sooner or later, predictably result in a fire apparatus



Image courtesy of William Peterson

crash and potential injuries and fatalities to firefighters and/or the public.

As recently as 2003, it has been shown that firefighters are more likely to die travelling to and from an emergency than actually fighting a fire. In addition to these firefighter fatalities, countless other firefighters and civilians are seriously injured in motor vehicle crashes involving fire apparatus, ambulances and personal vehicles. While many fire departments participate in some type of driver training program, these programs often fail to properly address the issues of vehicle dynamics and large truck behavior.

Firefighter fatalities from apparatus crashes have consistently been the second highest area of risk for firefighters and as much as 32% of fatalities experienced in a given year. Generally, the fatality numbers have consistently fallen between 15 and 25% of fatalities experienced in any given year. The fire service has been aware of these dreadful statistics for many years.

Over the past 20 or more years, the fire service and fire apparatus manufacturers, working together, have made changes and additions to NFPA 1901, *Standard for Automotive Fire Apparatus*, to incorporate the latest safety features and state-of-the-art design criteria in order to ensure the provision of safe fire apparatus, designed to meet the critical needs of fire departments, all over the country.

Yet after the implementation of new and improved safety features in fire apparatus designed to meet the requirements of NFPA 1901, the following questions still remain:

- Why are firefighter fatalities continuing to occur during responding and returning activities?
- What are the factors that continue to result in a record of unnecessary numbers of fatalities from apparatus crashes? and,
- Is there a pattern in fire apparatus crashes over the last 10 years that would seem to indicate that specific types of vehicles or types of chassis (e.g. custom or commercial) are more prone to crashes that will result in firefighter fatalities?

In an attempt to answer these, and other, pertinent questions relating to nature and factors of firefighter fatalities resulting from fire apparatus crashes, data obtained from



Images courtesy of William Peterson

the NFPA for fire apparatus crashes that have occurred in the last 10 years was examined. The data included incidents involving apparatus (engine/pumpers, ladders, and brush trucks, as well as certain special purpose fire department vehicles. The data included a total of 51 fatal incidents, resulting in 55 deaths. Thirty-three of these incidents were subsequently investigated by the National Institute for Occupational Safety and Health (NIOSH).

A crash analysis was performed from the 33 NIOSH reports included in the data from the 51 incidents in the NFPA crash data. This method of analysis is not as exact as an on-site investigation, but due to the nature and content of the NIOSH Investigation reports, this approach fulfilled the needs to examine factors that were determined to be the primary cause(s) of the fire apparatus crashes identified in the NFPA data.

Fire apparatus Crashes are extremely confusing events. How they occur, who or what caused them, and why they occurred are facts that crash investigators must determine. Each of the NIOSH reports clearly showed that NIOSH investigation team know the fundamentals of traffic accident investigation and know how to prepare thorough fire apparatus crash reports.

Analysis of the 33 NIOSH reports which were available on the 51 incidents reported by the NFPA, clearly showed that the NIOSH reports contained the



essential investigative elements who, what, when, where, why, and how the accident happened. As such, it is fairly easy to determine the cause(s) of the crash and whether any consistent trends can be identified, across the complete data set, to arrive at logical and objective conclusions.

The NIOSH reports were reviewed and analyzed to identify common elements that were identified in the 33 NIOSH reports that were examined. The results of the review and analysis of these investigations identified seven operational issues that were repeatedly identified as major contributing factors in the crashes. In most fatal fire apparatus crashes, more than one operational issue was present.

From the information contained in the 33 reviewed reports completed by NIOSH, it has been determined that the four leading causes of firefighter crash fatalities were:

- "Failure to Control" was a factor in 27 (81.8%) of the incidents examined,
- "Rollover" was a factor in 17 (51.5%) of the incidents examined,
- "Firefighters not wearing seatbelts" was a factor in 20 (57.1%) of the incidents,
- "Occupant ejection" was a factor in 15 (42.8%) of the incidents, and in 75% of incidents where occupants were not restrained by seat belts,
- The "Total number of firefighter fatalities" in the 33 incidents was 36.



◀ On December 2, 2005, a male career Captain (the victim) died, and a male driver/operator and a male firefighter suffered severe injuries when their apparatus struck a passenger van at a four-way intersection, left the road and overturned 1¼ times.

appropriate procedures which should be in place within the fire department. It clearly should be the responsibility of the employer to have in place a comprehensive Fire Department Occupational Safety Program which contains the following elements:

- a risk management plan,
- a safety and health policy,
- an accident prevention and review process,
- departmental standard operating procedures for the safe operation of apparatus and vehicles, and
- an ongoing training program for all firefighters on the risks and hazards likely to be encountered in emergency vehicle operations.

The US Fire Service, individually, departmentally, and collectively, needs to place as much emphasis on changing firefighter behavior as they did in improving apparatus safety. Until we are much more adept at improving and universally instilling a “safety culture” in the US fire departments, we are likely to continue to see needless and preventable fire apparatus crash fatalities take the lives of firefighters.

The responsibility for establishing and enforcing safety rules and regulations rests solely with the management of the fire department, including the company officers of apparatus crews. An effective fire apparatus crash prevention program requires compliance, commitment, and support from all ranks within the fire department. And while the responsibility for safe driving rests ultimately with the fire chief and all members of his or her management team. Daily accountability rests with the individual company officer. If it is determined that a clear violation of the emergency safe driving procedure has occurred, prompt and appropriate corrective action must be accomplished to reinforce the mandatory compliance with safe driving procedures.

➡ For more information, go to
www.cdc.gov/niosh/topics/emergency.html
www.nfpa.org/research

From the information contained in the 33 NIOSH reports, it has also been determined that:

- “Custom” apparatus were involved in 11 (33%) of the incidents,
- “Commercial” apparatus were involved in 10 (30.3%) of the incidents,
- “Non-compliant” apparatus were involved in 10 (30.3%) of the incidents,
- “No determination” could be made in 2 (6.1%) of the incidents.

Note: “non-compliant” refers to fire apparatus that were re-purposed (old oil tankers, military surplus, etc.) and used as fire apparatus, or vehicles that were “home built” that do not meet any standards, including NFPA 1901.

Information contained in the 33 NIOSH reports, it has also been determined that:

- 54% of Apparatus were 1990 and older models (23+ years old)
- 87% of Apparatus were 2000 and older models (13+ years old)

Conclusions and Recommendations

From an examination of the subject NIOSH reports we conclude that:

- There have been quantum improvements in fire apparatus crash performance starting in 2000, and the performance requirements

implemented in NFPA 1901 since 2000 have had significant positive influence on Fire Apparatus Safety and performance when fire apparatus are involved in a major crash incident. These efforts should be continued.

- Crash data examined in this study appears to show that fire apparatus designed to be compliant with NFPA 1901 editions after 2000 may be less likely to be involved in a crash that would result in a firefighter fatality.
- The current edition of NFPA 1901, contains “state of the art” design concepts to achieve the highest possible level of safety to the occupants of the fire apparatus that are currently available in the industry.
- Human factors continue to be a major cause of firefighter and public fatalities when fire apparatus are involved in a crash incident. The leading causes for these crashes are shown to consistently be:
 - Excessive speed,
 - Failure to stop at traffic control devices, and
 - Lack of caution at intersections.

Since the year 2000, or before, the US Fire Service has understood, very clearly, that if a fire apparatus crash is predictable, it is also preventable. Any problem with operational safety that might exist can be easily and effectively dealt with by

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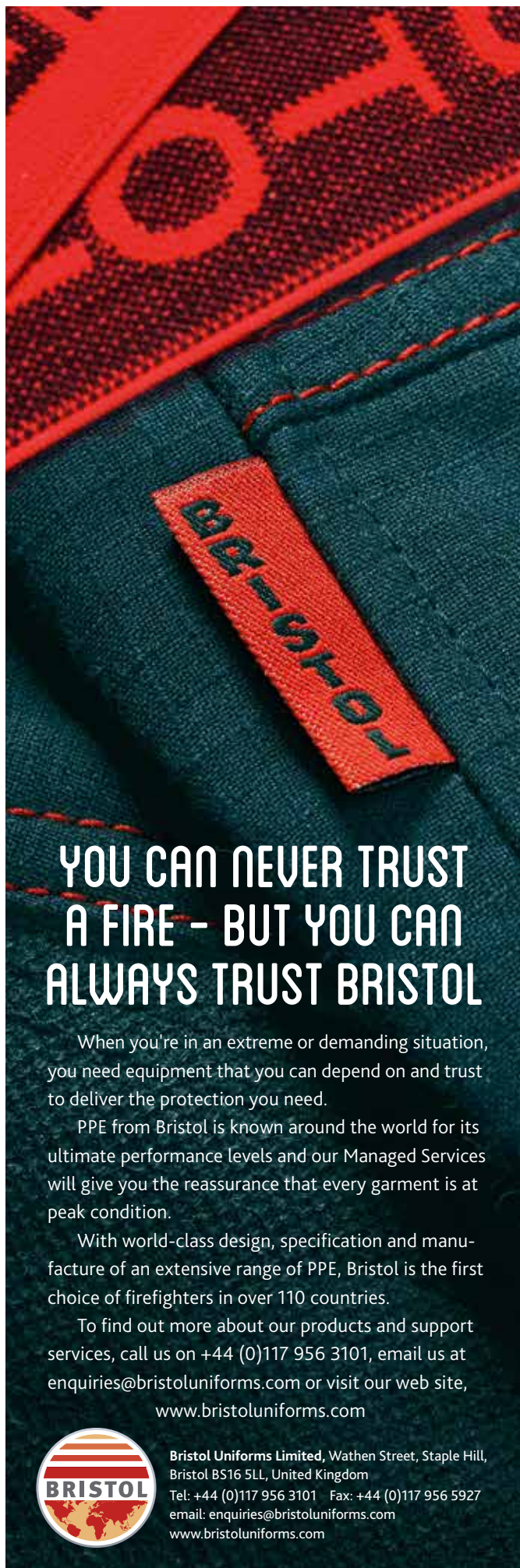
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Innovation In Early Wildfire Detection: Robots That Monitor The Forest 24/7

As governments and firefighters attempt to switch spending and efforts from wildfire suppression to prevention, the often overlooked detection stage is seeing a technology revolution that is making a difference.



Megan Pillsbury

Megan Pillsbury is Director of Business Development at Insight Robotics. She is responsible for expanding the business outside China.

The economic, social and human costs of wildfire are staggering and getting worse. In the US for example, annual suppression costs alone have hit nearly US\$1 billion in three of the past 15 years, and some predict that number will double in the next 15 years. Accounting for the loss of assets, property and human lives and livelihoods further magnifies this number.

The risk and frequency of wildfire is increasing due to climate change and poor land management allowing fuel to accumulate. On top of that, many of these fires happen in or near the wildland urban interface (WUI) – areas where forests intersect with urban development – increasing the cost of wildfire suppression and also damage.

With the costs of wildfire suppression rising so quickly, governments regularly spend significantly more than their budgets allow, often borrowing from

funding intended for fire prevention. Wildfire prevention methods including public education, prescribed burning and better land management are proving to be effective in reducing wildfire risk, particularly in WUI areas. Research shows that each dollar spent on wildfire prevention can save several dollars in wildfire suppression, yet prevention continues to be underfunded.

Even if budgets allowed for comprehensive wildfire prevention, fires will continue to be a problem, and the little discussed step between prevention and suppression is detection. Early detection is crucial to effective fire suppression. The larger a fire grows before it is detected, the more expensive it is to suppress the fire, and fires allowed to grow beyond a certain size can't be fought at all in some cases. The fire suppression community commonly supports the idea that a fire should be detected within five to 15 minutes after ignition depending on weather conditions. In any case, once a fire starts, the single greatest determination of the success of fire suppression is detection and response time.

▼ **Once a fire starts, the single greatest determination of the success of fire suppression is detection and response time.**



Methods of wildfire detection

Most parts of the world with high risk of wildfire employ some method of detection. The traditional method is manned watchtowers. Humans in towers can scan an area with up to 30km radius and identify fires by the smoke columns they create. At a distance of 13km, a human can reliably spot a fire 22m² in size, though this method is severely limited by weather conditions such as fog, clouds, reflection by sun and objects, and time of day. Manned watchtowers can be expensive, especially in regions with high cost of employment, and humans fatigue very easily when doing visual surveillance.

There are technologies that automate wildfire detection so as to minimise the human factors:

- CCTV can reduce the number of humans required to survey an area by centralising multiple views in one area. However, laying cable can be expensive, and surveillance is still subject to human fatigue.
- Satellite imagery can be used for wildfire detection, but only if there is no cloud cover. The fire size required to identify it from satellite is at least 100m², and the scan time is at least three hours (though this is improving). At present, satellite is better suited for monitoring remote fires or fires with low risk of becoming disasters.
- Automated smoke detection algorithms based on CCTV or a series of photos can also be used to identify fires. These algorithms look for smoke behaviour by analysing multiple frames of images taken of an area. Automated smoke detection can identify a fire 100m² in size at 10km distance, and in testing is shown to have a similar detection rate to manned watchtowers.

However, the most recent of these technologies was introduced 15 years ago, and there has been little innovation in wildfire detection since... until now.

Thermal detection

Just last year Insight Robotics introduced a new wildfire detection technology that enables the use of thermal sensors over long distances to effectively detect and locate wildfires. This invention, which won the Entrepreneurship of the Year Award from IBM in 2014, is the first in the world



Images courtesy of Insight Robotics

to spot an emerging wildfire as small as a single 2 sq m tree within a 5km radius.

The problem with simple and affordable thermal sensors is their limited range. A simple thermal sensor can be combined with basic software to trigger an alarm when a heat 'signal' above a certain intensity level is received. The heat 'signal' emitted by a fire at 5km distance from the sensor would degrade significantly by the time it reaches the sensor. In order to trigger an alarm, the threshold level needs to be set very low. However, nearby objects that are not necessarily on fire but are hot (for example rocks or leaves in the sun) may exceed the low threshold level and trigger a false alarm. If the threshold level is increased to reduce false alarms, distant fires will not be detected.

The latest innovation in wildfire detection includes a wildfire detection robot that uses a Geospatial Intelligence System (GIS) in combination with patented algorithms to dynamically set the threshold level of the thermal sensor based on the distance of the fire, overcoming the range limitation of a simple thermal sensor. It can identify a fire 2m² in size at 5km distance, and 20m² at 8km distance. The robot can calculate the distance of the fire because it works with the GIS to first identify the location of the fire, and the single robot can report the location of the fire to the response team.

The limitation of thermal detection is that the sensor must have line of sight to the fire. Smoke detection makes it possible to identify fires behind a hill that a robot would not identify.

Unlike smoke detection, thermal

▲ The Insight Robotics wildfire detection robot uses smart algorithms and a Geospatial Intelligence System (GIS) to locate a fire and alert the response team.

detection is not limited by weather conditions or time of day. These robots monitor for wildfire 24/7 and will identify fires when they are very small and manageable. Insight Robotics has more than 60 robots operating in China with 100% effectiveness in detecting wildfires per the specification to date. In Jinan City in 2014, eight robots identified 173 of 173 fires, none of which grew larger than 20m² by the time they were suppressed.

Prevention, detection, suppression

Minimising wildfire disaster requires a comprehensive strategy for preventing, detecting and suppressing wildfire effectively. The already high and continually growing costs of suppression can be drastically reduced if prevention and detection mechanisms are properly employed. By increasing investment in prevention and early detection, overall spending will be reduced, and those funds can be used for other public and government spending. Furthermore, the impact of wildfire on assets, society and humans will also be reduced. Fire managers won't be able to stop building in the WUI or oncoming climate change, but they will be better able to prevent disasters caused by wildfire.



For more information, go to
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One of the primary objectives in basic firefighter training is the development of knowledge and proficiencies associated with various types of forcible entry techniques and building access as well as search and rescue/victim removal techniques during a structure fire incident. In many fire schools, nearly half the allotted time is spent on these fire ground activities. In the structural firefighting world, one must continuously train to maintain proficiency in forcible entry, ladder deployment and search and rescue so that time is not lost during that critical period of survival.



Jason Graber

Jason Graber is a member of the ARFF Working Group Board of Directors and currently serves as the secretary and education and training affairs officer for the organization. He has spent the last 12 years in ARFF with the Metropolitan Washington Airports Authority Fire and Rescue Department. In his current assignment, he is the Battalion Fire Chief of Safety and Training.

Collectively, these skills are often brought together and help to make the difference in a successful or unsuccessful outcome of any incident.

When we switch gears and talk about Aircraft Rescue and Firefighting (ARFF), these tasks (access to aircraft and search and rescue/victim removal) are also taught, but sometimes take a back seat to mass application of extinguishing agent activities from the foam units that are assigned to our airfields. Additionally, minimum staffing at many airfields may make entry into the aircraft during the initial minutes of the event impractical or impossible. The time prior to arrival of mutual aid assets will largely be consumed by extinguishing agent

application and ensuring that a rescue path has been established and maintained until additional help arrives or all of the passengers have self-evacuated from the aircraft.

In recent years, newer versions of large frame aircraft have given rise to the concerns of the sheer size of aircraft and the quantities of passengers that are being carried on them. The ARFF world has not only embraced the modern marvels that these aircraft have brought to the world of air travel but also the potential ramifications that exist when one of these or any aircraft is involved in an accident. Additionally, the explosion of social media and a twenty-four hour real time news media cycle has on nearly a weekly basis demonstrated how frequent aircraft emergencies are becoming. It is expected that local airport fire departments be prepared to handle and successfully mitigate any aircraft emergency regardless of the size.

▼ An evacuation of a Boeing 757 in September of 2011 at Washington Dulles following an engine fire.



Image courtesy of Jason Graber



Image courtesy of Jason Graber

The best case scenario for passenger survival is for ARFF personnel to arrive immediately after the accident and begin critical functions that often do make the difference in the survivability. Gaining access to the aircraft cabin may be increasingly more difficult if passengers are already evacuating from the aircraft. This can be further complicated by the condition and position of the aircraft upon arrival at the scene. Aircraft accidents rarely occur in ideal conditions and it is incumbent upon first arriving ARFF personnel to adapt and overcome with the mindset of making the situation better than we found it. Evacuating passengers from an aircraft is certainly a good sign for us on the outside, but conversely creates access problems for us, as our entry points are now potentially even more limited.

Gaining access and rescuing passengers from an aircraft is about attitude as much as it is about ability and skill. Certainly a risk management decision must take place before making the decision to enter an aircraft, but ultimately the will and desire to enter the aircraft wreckage is based upon "this risk management decision"? In aircraft rescue, we know the survival clock begins ticking the moment that fire breaks

out or a crash occurs. Our mindset, our pre-plan and team training need to launch instantaneously upon notification of the event. This is where the attitude, ability and skill come together and the mindset of maximizing survival drives the end result.

Preparing for routine and difficult access scenarios is an essential element of emergency planning. Early on in my career, I was taught that the ideal place to access the aircraft is via an over wing exit or an exit near the wing, as this is pretty much the center point of the aircraft. I still believe in this tactic for obvious reasons but I also understand that it's not an absolute and we need to train for every possibility. Once inside, we have the ability to go forward or aft and access almost the entire aircraft (regardless of size) to initiate an interior fire attack provided we have hose lines that are long enough. The final determination as to whether or not to make entry (and/or where to make entry) and initiate a fire attack will be made during size up and will be driven by a number of factors, including passenger evacuation routes and interior/exterior fires.

ARFF personnel need to have a thorough understanding of aircraft construction and be proficient in the operation of the various aircraft entry doors and over wing exits,

▲ Crews practicing on laddering the Airbus 380 – in this case three ladder towers are set up and working on making access to the aircraft.

as well as the "quirks" that are associated with them. From the perspective of gaining access to the aircraft, this knowledge base is essential, not just on the operation of the door, but also contributory factors, such as what happens if a particular door does not disarm from the outside and the slide deploys or if the door was damaged in the accident and thus inoperable. The slide deployment will not only cover the entire opening of the door, but also possibly 10" to 12" on either side of the door and puts advancing crews in harm's way, as the slides deploy.

Victim Search and Rescue and Removal

One of the most challenging tasks performed by ARFF personnel is the search and rescue and ultimate removal of passengers that are trapped on a damaged aircraft. As the images from the Continental (Denver, Colorado-2008) and Asiana (San Francisco, California- 2013) accidents and countless others have demonstrated,



Dr. STHAMER HAMBURG

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Images courtesy of Jason Graber



▲ The Boeing 747 – the sheer size of large frame aircraft requires personnel and organizations to have definitive plans and procedures on how to make access to these and all sizes of aircraft that frequent (and don't) your airports.

◀ The IL-62 is an aircraft that normally doesn't frequent either of our airports but appears from time to time and depicts the need to be familiar with all kinds of aircraft.

making access to the aircraft may be the easy part of this process. One of the things that may be encountered on the interior of an aircraft accident is the possibility of passengers still buckled into their seats, or severely entangled with the remainder of the seats or components of the cabin. It is important for incident commanders to determine how many personnel will be needed for the tasks of interior rescue. These personnel are not included in any fire attack group that may be needed to extinguish an interior fire, or at least hold it in check long enough to get the aircraft evacuated. When deploying personnel to the interior, the incident commander must weigh heavily how many people may be needed to affect a rescue versus how much room is on the inside for rescue personnel and any tools that may be needed. Personnel must also keep in mind that moving wreckage on the inside of the aircraft is not considered destruction of evidence if it means getting to a viable victim.

Once victims are disentangled from the wreckage, they must be moved to the exits and removed from the aircraft. It is important for interior group or division supervisors to be communicating with the exterior supervision regarding status of the evacuation or rescue and location(s) to which victims are being transferred. Effective victim management is essential to ensure that all crew are on the same page so that rescued passengers are handed off in a safe and efficient manner. This hand off includes not only removing victims from the wreckage, but also getting them to the casualty collection point. A staffing task analysis should be conducted which identifies the critical tasks required for the worst case scenario, the number of personnel required to complete the task, and the number of minutes into the incident that crews should be available to execute it. If the staffing does not exist "on airport", mutual aid must be trained and their efforts coordinated to understand the responsibilities.

Closing

It is not assumed that the tactics discussed will work for every airport. An airport fire department must establish plans that will work for them. If the resources at an airport do not include a readily available ladder truck or stair truck, the fire department should be training mutual aid personnel in these skills. Bringing them onto the airport during an emergency and asking them to complete a critical task, such as laddering an aircraft, may be disastrous without previous training. When mutual aid response is depended upon for gaining access or other tasks critical to survival, formal mutual aid agreements must include the expectations of the airport, as well as the capabilities of the mutual aid department.

Preparation after the fact is not preparation at all.



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Dan Willis

Captain (ret) Dan Willis served with the La Mesa Police Department for 26 years. He is a former crimes of violence, child molest, homicide detective and SWAT commander, and La Mesa's Wellness Coordinator.

Consistently being immersed in death, tragedies, danger, heartache, and suffering can often scar the spirit of any first responder – particularly firefighters and EMT personnel. Tragically, first responders are more likely to kill themselves than die in the line of duty. There are more than twice as many problem drinkers within the first responder professions than the general public. An estimated 15-18% suffer from PTSD, with an estimated 20-25% who will suffer at least one life-altering addiction during their career. It is essential for fire personnel to incorporate proactive emotional survival and wellness

practices that nurture, protect, and heal their spirit—to bulletproof their spirit to prevent them from becoming victims of their profession.

The inherent adverse effects of a career as a firefighter or medic are poisonous and cumulative. Like a cancer, dedicated yet unsuspecting first responders have the potential to slowly succumb to the toxic, debilitating effects of acute stress and trauma with little training on how to effectively process the internal damage. The job has an inherent ability to turn us into someone our loved ones no longer recognize. Following is emotional survival strategies based upon the award-winning book, “Bulletproof Spirit: The First Responders Essential Resource for Protecting and Healing Mind and Heart,” (firstresponderwellness.com).

▼ A firefighter rushes an injured boy to a waiting ambulance after being injured in a house fire.



Image courtesy of www.firstresponderwellness.com



Image courtesy of www.firefighterwellness.com

The Warning Signs

Emotional survival means having the ability to process stress, overcome trauma, while serving with compassion without the job being crippling either mentally, emotionally, or physically. If you are doing nothing proactively to develop and promote emotional survival, then you are allowing the job to victimize you.

Our spirit is the foundation for our physical, mental, emotional wellness and the quality of our life. Our spirit consists of everything within that makes us resilient, able to cope with trauma; it is our motivation to compassionately serve and help others; our sense of aliveness; and it is what makes us human. And it is our spirit that suffers most from a career as a first responder. The first objective is to understand the several warning signs that a firefighter's spirit has been injured and not processing stress effectively.

1 Isolation

Over time there is a natural tendency to become increasingly isolated. This involves withdrawing—preferring the company of work colleagues or being alone over associating with other friends, family, and their related activities. One develops the tendency to disengage, not wanting to make decisions away from work, and preferring not to be involved with others, even spouses and children. Eventually, you can become distant and reclusive.

2 Irritability

When affected, you'll tend to develop a shorter-than-usual fuse, fly off the handle for seemingly insignificant reasons, respond to questions in one-word sentences, usually say you are "fine" just to stop any further conversation, and keep everyone near you walking on eggshells for fear of how you may react. You become increasingly more on edge, restless, and agitated.

3 Difficulty Sleeping

Having difficulty consistently getting a good night's sleep—either because of sleep interruptions several times each night or because of only being capable of sleeping for a few hours—is a significant sign that you are not effectively processing stress and are being adversely affected by the job.

4 Anger

When seriously affected, you begin to develop a pattern of taking out your stress and frustration on others, often those they care about most.

5 Emotional Numbness/ Feeling Dead Inside

Becoming emotionally numb or dead inside is inevitable, at least initially, and firefighters need to consistently work to prevent it from overwhelming them. The job will naturally tend to make you want to shut down emotionally

▲ August 22, 2011 El Cajon, California: SWAT Police officers and firefighters fight a house fire where a barricaded man had just shot and killed his baby daughter, mother-in-law, set his house on fire, and critically wounded an officer with a shot to the neck.

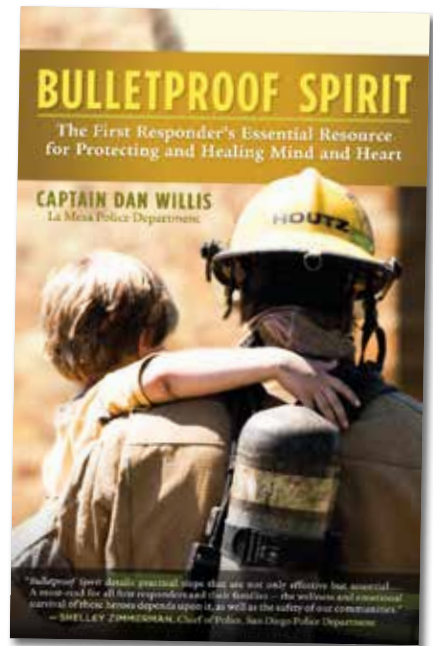
as a way to no longer feel the sense of helplessness, frustration, stress, trauma, and emotional pain of the job. As you shut down emotionally, you tend to become disassociated with others, indifferent, and disengaged with life. However, this inevitably leads to seriously damaged relationships at home.

6 Lack of Communication

As one increasingly withdraws, they will tend to make the serious mistake of keeping everything inside. This becomes serious because, as their communication skills diminish, they will refuse to talk about how work is affecting them. Feelings of depression, anxiety, helplessness, anger, fear, and other negative emotions will then tend to intensify.

7 Cynicism, Distrust, and Loss of Work Satisfaction

If any of these warning signs are not addressed, you will likely become highly dissatisfied at work, extremely cynical, and distrustful of most everyone. This cynicism and negative outlook can send you into a downward spiral that eventually could affect every aspect of your quality of life.



▲ Capt. Willis' *Bulletproof Spirit* is a unique emotional survival guidebook providing essential proactive wellness practices.

◀ Police funeral – another fallen hero. There are many more untold victims of the professions of first responders – their families.

8 Depression

Ignoring any of these warning signs eventually can lead to clinical depression. Left untreated, this may worsen and become potentially severe depression, resulting in substance abuse and addictions, broken families and lives, and a host of other debilitating problems, up to and including suicide.

9 Drinking as a Perceived Need or Habit

Drinking or consuming other substances because of a perceived need or by habit is a major warning sign. Alcohol abuse is a serious problem among firefighters and medics. Drinking because of a need or habit tends to only intensify already serious problems and emotional issues, as well as problems at work.

Self Awareness

The first step for a firefighter to bulletproof their spirit is to learn to become more self aware of not only how the job may be adversely affecting them, but what emotional survival methods may be effective to maintain their wellness. First responders should periodically seek opinions from their spouse and loved ones regarding whether they believe you have been changing in any

way, how the job has been affecting you, and what specifically the first responder can do to improve their relationships.

Periodically ask yourself how you cope and manage career stress, and whether what you have been doing is healthy. It's helpful to think about what positive things you can do that you enjoy, that will help to breathe life back into your spirit; how to become more engaged with family and life-enhancing activities, and how to promote your health and wellness more consistently.

PTSD – Unresolved Trauma

PTSD is not a weakness. It's not about what's wrong with you; it's all about what happened to you. PTSD is really an injury to the brain's ability to process a traumatic incident or acute stress. The brain's natural processing ability becomes injured, or stuck, which can cause a person to repeatedly re-live the experience while experiencing crippling emotional reactions.

Such was the case with a La Mesa (San Diego County) Firefighter who for whatever reason, after one particular fatal drunk driving accident, began seeing blood everywhere in his mind's eye – blood on his daughter's face, his wife, in the shower, and on his hands. He also kept having repeated

nightmares where the dead woman who he had recovered from the tangled debris, suddenly opened her eyes and said the firefighter had killed her. The more he tried not to see these images, the more often and more intensely he would see it.

A colleague told the firefighter about a PTSD therapy treatment called EMDR (Eye Movement Desensitization and Reprocessing). The officer tried this therapy with the Fire Department's psychologist and after only 2 sessions, never saw phantom blood again and never again had that nightmare. The therapy is specifically designed to heal the brain's ability to process the trauma and place it in its proper perspective. Although you will always remember the incident, with treatments such as this you can remember it without being emotionally crippled during those memories – trained EMDR psychologists can be found at www.emdr.org.

In the second and final part of The Bulletproof Spirit, we will explore Wellness Practices and look at several emotional-survival and wellness principles that can be developed by emergency first responders.



For more information, go to www.firstresponderwellness.com

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visit **our market page**

What's New with... Thermal Imaging Cameras

With the greatly increased use of thermal imaging technology, the leading manufacturers have boosted their research and development efforts to provide firefighters with the most efficient and reliable equipment. In this Buyer's Guide we highlight the latest offerings from the World's leading suppliers.

Bullard

Thermal imagers manufactured by Bullard are designed to endure the harshest environments to meet the demanding needs of firefighters. The Company introduced its first high-resolution thermal imager to the fire service market in 1998 with the innovative Bullard TI. Today, Bullard continues to lead the industry with innovative thermal imaging products and accessories with its newest line of thermal imagers...the X Factor Series.

Bullard's X Factor Series featuring the Eclipse® LDX, offers the latest state-of-the-art infrared engine technology and image processing techniques for the ultimate image performance in fire conditions. With the X Factor Series, firefighters are better equipped to capably address ever-changing fire conditions, identify egress points next to raging fire, and reveal potential victims in hot and smoky scenes.

The X Factor Series of thermal imagers includes the Eclipse LDX, T3X, T4X, and Eclipse X. Bullard plans to release the T3X and T4X in the third quarter of 2015, followed by the Eclipse X. All X Factor Thermal imagers come standard with an industry leading five-year, full service warranty on parts and labor. In addition, all X Factor Thermal imagers are eligible for Bullard's upgrade program available through December 31st 2015.

 For more information, go to
www.bullard.com



Scott Safety

As a world leading provider of advanced thermal imaging equipment to the fire industry, Scott Safety prides itself on its unique ability to enhance the performance and operability of its thermal imaging cameras well beyond their core and most basic function. Our cameras are well-known for providing firefighters with the ability to fully interpret a fire scene and make better, safer, tactical decisions.

Our X380 thermal imaging camera powered by ISG TECHNOLOGY, provide firefighters with an unrivalled level of situational intelligence, they provide unique hot spot tracking, an enhancement that enables firefighters to immediately identify high-risk areas in the floor or ceiling of a fire scene, its equally unique cold spot tracking enhancement, helps firefighters locate gas or chemical valve leaks and the cameras tactical colour, gives the user a true visual picture of rapid heat changes.

Scott Safety employs the largest and most comprehensive engineering teams of any dedicated firefighting TIC manufacturer in the world. Based across two continents in four separate facilities, our exceptional in-house development team are able to create and develop product enhancements that ensure our thermal imagers remain at the forefront of technological advancement.

Owning a Scott camera you'll be getting the most technologically advanced thermal imaging solution, designed specifically for your application in the most extreme environments, and you'll get total peace of mind and absolute support with our complete after-sale service throughout the life of your product.

 For more information, go to
www.scotsafety.com/emea





MSA Safety

MSA introduced one of the first firefighting thermal imaging cameras over a decade ago. In the years following, we've refined TIC design through innovation and expertise, delivering several successful generations of market-leading TICs. Our state-of-the-art cameras help you in various situations, such as fast and safe navigation in smoke filled rooms.

As our EVOLUTION® 5000 TIC series could not easily be upgraded to fulfill the new American standard NFPA 1801 (Standard on Thermal Imagers for the Fire Service) we decided to develop a new TIC. The EVOLUTION® 6000 TIC platform comprises three models to offer the best mix of features, including NFPA 1801 compliance, to support the thermal imaging needs of all first responders.

NFPA-compliant third-party certification, non-incendive equipment (UL Class 1, Div 2 which equates to ATEX equipment group II [industrial], zone 2, gas group IIB) for additional safety within combustible environments, fireground-tough product design provides waterproof shock resistance, and a Camera Configuration Application customize camera settings to meet customer needs.

EVOLUTION® 6000 Basic TIC provides easy to use performance – a simplified fireground tool. Standard flashlight provides extra visibility for firefighter proximity to enhance safety and situational awareness. Laser pointer pinpoints hot spots and other areas of interest to allow others to take fast, specific action.

EVOLUTION® 6000 Plus TIC adds additional tools to aid and improve fireground safety and decision making. 2x / 4x zoom gets a closer look at areas of interest. Six user-selectable colour palettes provide flexibility to view thermal images. A compass allows for faster rescues and improved situational awareness by displaying letters or icon for directional information. Optional integrated video transmitter enables remote monitoring for improved decision making.

Optional integrated range finder offers more usable information to enable faster, more precise action from a distance of 5 to 30 meters (replaces flashlight option).

 For more information, go to www.msasafety.com

Halo Thermal Imaging

Halo Thermal Imaging, based at Durham Tees Valley Airport recently launched the first true, hands-free thermal imaging camera at the Interschutz tradeshow in Hannover, Germany. The Halo is a game changer for the industry, providing firefighters and first responders with the freedom for versatility required in hostile environments. With its patentable technology; it's the future of firefighting.

The Halo is the world's smallest and lightest camera built for firefighting and search and rescue. Attaching the camera to a firefighters helmet, in the same manner as a torch, gives the user the ability to use both hands with The Halo providing crystal clear images. Weighing in at just 390g, The Halo also features a 10-hour battery life, 2.5" high definition display, snap shot function and superior dynamic range. When temperature is important to the wearer, spot temperature measurement and multi colour maps are available as standard with a single button configuration making for very simple operation.

Head of Innovation at Halo, James Brooks, says "Having been involved in thermal imaging for nearly two decades we know the importance of giving firefighters as much information as possible. To do this and to give them freedom of movement at the same time was a logical step." James went on to explain, "To design and build a compact camera at only 60mm x 70mm x 125mm and bring the weight below 400g was our target. To then give the wearer the ability to move the display was then another challenge knowing how difficult some of the environments are that they operate in. It has to be robust to withstand high temperatures and also the hard knocks that can happen on the fire ground. We are extremely proud of the result."



For more information, go to www.halothealthimaging.co.uk



NEW: FLIR K2

Extremely affordable thermal imaging camera for firefighters

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- Compact and easy to use
- Robust & reliable
- Multiple image modes
- Multi-spectral dynamic imaging (MSX)
- Multiple firefighting applications

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Dräger

A trusted and loyal partner to the fire and rescue service for generations, Dräger's ATEX and UL approved thermal imaging technology is used by firefighters across the globe.

The Dräger range includes its UCF 6000, UCF 7000 and UCF 9000 – a thermal imaging portfolio equipped with extensive safety features, intuitive operation and stringent approvals – meaning it can also be used in potentially explosive atmospheres.

These lifesaving pieces of equipment are valuable tools for essential orientation when fire, smoke and darkness make navigation difficult.

They are all equipped with an integrated laser pointer which enables team members to communicate effectively and warn each other of potential dangers.

The devices help firefighters to manage the challenges they are faced with, such as assessing situations, measuring the size and scale of fires, or searching and finding injured persons. Dräger's cameras generate an instant, clear picture of different heat signatures not visible to the naked eye, covering a wide temperature range of 40 °C to 1000 °C.

The Dräger range of thermal imaging cameras

- **UCF 6000** – delivering excellent image quality even under the most extreme conditions, characterised by its ease-of-use and essential, innovative functions.
- **UCF 7000** – users can see more and make better decisions with the optimal display options. The camera is intrinsically safe (ATEX zone 1) and offers the maximum level of reliability.
- **UCF 9000** – thermal imaging and digital camera in one, ensuring firefighters are well equipped for every task.



For more information, go to
www.draeger.com



FLIR Systems

FLIR Systems is adding the K2 and K65 to its industry-leading lineup of K-Series thermal imaging cameras that provide firefighters with the capability to see through smoke, locate and rescue victims, identify hot spots, navigate safely, and stay better oriented during response missions.

Extremely affordable thermal imaging for firefighters

The K2 brings FLIR's powerful life-saving thermal technology to a broader base of firefighters at a breakthrough price point. Powered by FLIR's Lepton® camera core, the compact K2 delivers detailed thermal images at 160 x 120 resolution and is equipped with FLIR's patented Multi-Spectral Dynamic Imaging (MSX®) technology that significantly enhances image quality, allowing firefighters to see key structural details in a variety of environments.

NFPA-compliant FLIR K65

The K65 is a feature-rich thermal imaging camera that is fully compliant with the NFPA 1801-2013 Standard for Thermal Imagers covering usability, image quality, and durability for firefighting. The K65 offers crisp 320 x 240 thermal resolution and features onboard video recording and playback, which is useful for debriefing and training.

The K65 also features FLIR's revolutionary Flexible Scene Enhancement™ (FSX) technology which significantly enhances scene detail and contrast in total darkness and smoke-filled rooms. FSX™ will extract image details, like edges and corners, from the original image. These details are weighted and combined with the original image to create an image with enhanced details, making them visible to the user, even in those scenes with extreme temperature dynamics that are typical for a firefighter's job.



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EN 16473:2014
For technical rescue
EN 443:2008
For fire fighting in buildings
and other structures

Work-related Stress and Mental Health Issues in the Fire Service

Once upon a time the leading cause of absence from work was musculoskeletal complaints: bad backs, bad joints and the like. Not any longer. Although still number one, musculoskeletal impairments are closely followed by mental health problems, many but not all of them arising from work-related stress. The cause of the stress is largely an irrelevance for employers, the big issue is what can be done about the prevalence of stress-related illness in the Fire service?



Karen Jackson

Karen Jackson is Director and Senior Solicitor at didlaw and a leading authority on mental health disability and discrimination.

Life is a long-term health condition. All of us are subjected to varying degrees of stress both inside and outside of work. Common causes include relationship issues, financial worries, general concerns about the future, family, you name it, it can cause stress. Stress is in itself not an illness. Some people enjoy a healthy amount of stress and thrive on it. For others it quickly spirals out of control and can cause physical as well as mental symptoms: headaches, rapid heart rate, increased blood pressure. The threshold at which stress becomes a problem to health is different for everyone: two people subjected to the same stress will not necessarily respond alike. But left unchecked stress can become common mental health conditions like depression and anxiety.

There is plenty of evidence to show that the threshold for unhealthy stress is actually much higher in the emergency services because people who do this kind of work acknowledge when they enter the profession that it is a stressful one. Some are even drawn to it. Workers can also freely discuss stress in an environment which is inherently stressful if they so choose. Sometimes however that is not an easy discussion which is one reason why it can go unchecked.

So how can employers know who is at risk of unhealthy stress? Men are notoriously poor at expressing when they need help. Mental issues are seen as weakness. Men do not want to let on that they are struggling. The Mental Health Foundation is doing work specifically around how to engage men at work to be more mentally healthy and that begins with being open. And recognition that mental ill

health is every bit as real and as serious as physical ill health.

Mental illness can amount to a disability under the Equality Act 2010 if it is long-term and has a substantial adverse impact on daily function. The emphasis is on function not the label given to a health impairment. If there is a substantial impact in or out of work mental ill health can be a disability. If disabilities are present employers must by law make reasonable adjustments that can help the affected employee stay at work, return to work after ill health, aim for promotion, etc. Even if disability is not 100% established employers are advised to consult with affected staff to see what, if anything, can be done to retain talented people in the workplace.

So what does a reasonable adjustment for mental ill health look like? The legislation offers no prescription. The sky's the limit! A good dose of creative thinking may be called for. Starting by consulting the employee who is struggling or who feels they cannot return to work is always the best place. And remember: it's not a blanket "do everything" the employee asks. The starting point is for the employee to identify what practice, provision or criteria of the workplace is causing disadvantage. What is the thing making life difficult? Is it the hours? Is it the place of work? Is it the team he/she is in? Next: is the thing having a major impact? If the impact is minor or trivial the law does not require an employer to do anything. A sensible approach is advised however: if it seems trivial to an employer but is a big deal to an employee, and provided it is not too costly or too disruptive, why not give it a whirl? Many of the legal complaints I see on my desk arise from something simple being ignored. And remember too: treat

people like you do care. There's no faster way to a grievance and long-term disruption than to ignore a complaint whether you think it is legitimate or not. I never cease to be amazed at the lack of common sense and basic human consideration around reasonable adjustments and mental ill health at work. It isn't rocket science. Simple steps like allowing a late arrival or early departure so the employee can go to counselling is an obvious example. If you want to make sure the system is not abused ask to see an appointment card. Moving someone to short-term alternative duties while they get back in the swing of things after a period of mental illness is another obvious example of a simple and reasonable adjustment.

All too often I hear employers saying they cannot offer any adjustments. I doubt that is true in the vast majority of cases. Another thing I hear is "But I don't think it will make any difference". The solution is obvious: if it's a simple adjustment that you can make why not just try it out? If it doesn't work you can say I told you so and try again. If there is nothing that can be done you have discharged the legal duty and need do no more. Of course that doesn't mean you will avoid a tribunal but as long as a proper process is followed you will manage risk. If an adjustment does work you have a happier employee who will be back to work sooner and hopefully for longer. And also an employee who believes he/she is being looked after and who should give greater engagement. What's more, trying a possible adjustment that fails can only be insurance against potential Employment Tribunal proceedings. At least you tried.

I'm often asked "What is a reasonable adjustment?" Exactly what it says on the tin! Essentially it's any adjustment which might help a person with a disability, making it easier for them to stay in work or return to work after time off or making it easier for them to access promotion without unnecessary hindrance. But it must be reasonable. What is reasonable? I hear you ask. There is no hard and fast rule. It will depend on the size and resources of the organisation. The Fire service will have budgetary limits but probably more importantly it will have health limits in place to safeguard the public and other team members. If a mental illness causes a firefighter to undergo, for example, difficulty in making decisions, it might be advisable

Image courtesy of Andrew Rich 2012



for that person not to lead in an emergency situation until his/her condition has stabilised and/or resolved. As always there will be a balance to strike between the best interests of the individual concerned and the organisation. In a field intricately linked with safety and team work safeguards on safety may be a legitimate reason for an adjustment to be declined.

There is no right or wrong answer to reasonable adjustments. It is, like many areas of law, a grey area. What you need to know is that if an adjustment is reasonable and you won't allow it you may be breaking the law. And if you decline to make an adjustment for whatever reason you must document the steps taken to reach that decision if you want to be able to justify your decision to not make the adjustment and avoid liability.

So where do you go for more help? I am an expert in disability discrimination in the work context and with a particular emphasis on mental health. There's not much I have not seen or advised on. I'm only ever a phone call away. For free resources the Occupational Health adviser for your workplace may be able to come up with some excellent proposals for adjustments. Ask the employee who is asking for adjustments what might help. It seems like a no-brainer but it's one that often falls between the cracks.

Check out the free resources on disability online at the Equality and Human Rights Commission website

<http://www.equalityhumanrights.com/>. Their Employment Statutory Code of Practice provides an invaluable source of free advice and guidance in plain English and contains lots of practical examples. It can be downloaded and saved as a PDF for future reference here: <http://www.equalityhumanrights.com/sites/default/files/documents/EqualityAct/employercode.pdf>.

And if its mental health advice you are after look no further than the excellent website of the Mental Health Foundation (MHF) <http://www.mentalhealth.org.uk/>. The MHF leads on research around common and serious mental health conditions. Their website and guides offer a wealth of free guidance and advice to help dispel a lot of the unhelpful myths around mental illness.

If an all-round education on the subject is what you really want you can do no better than to come to one of our didlaw EDUCATION conferences. Visit www.didlaw.com/education.

Our next event, a one day course, Mental Health Disabilities and Stress at Work 2015, will take place in London on 21 October 2015. If you are a manager of people it will give you all the tricks and tools you need to successfully manage a mentally healthy workforce and reasonable adjustments around it. We promise not to let you leave until you are fully enlightened!



For more information, go to
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The Strategic And Operational Benefits Of Personal Emergency ID

After saying goodbye to his wife that damp, cloudy Tuesday, Bob got into his truck, sipped his coffee, and started to drive to work in a neighboring town about half an hour away. To Bob, it seemed like a pretty average, normal working day, but it was far from it.



Dr Treive Nicholas

He had recently started a contract job on a fairly large construction site with a range of essential building / infra-structure tasks and with colleagues he hardly knew. Bob sort of knew their names and their favorite football team, but not a great deal else. All in all, though, they were not a bad crew and they had the construction project on schedule.

At 11 a.m., without warning, an on-site electrical fault occurred, generating both fire and a large amount of hazardous smoke near to where Bob was working. Quickly overcome by the fumes, Bob tried to move away, but collapsed near-by.

The firefighters were first to the incident and located the source of the fire and Bob, who remained unconscious.

At this point, Bob's supervisor and co-workers realised how little they actually knew about him in order to help the paramedics when they arrived.

▼ A Personal Emergency ID regime immediately makes information available to first responders.

Fortunately for Bob, his site health and safety manager had implemented a Personal Emergency ID regime on site. When the firefighters moved Bob to a safe place the paramedics quickly assessed him and accessed his ID. They learned a lot very quickly.

This told them that Bob already had an underlying respiratory condition likely to have been severely exacerbated by the fire fumes. In addition, they learned his full name, what medication he took, and how to contact his family in the event of an incident like this.

I'm pleased to report that this incident had a happy outcome and that Bob returned to the site a few weeks later, fitter and holding down his job well. It illustrates very clearly how little is often known about employees and contractors in the event of an accident or medical condition arising.

In addition, we can see how small amounts of information about a person at the right time can have a very positive bearing on management of the situation by medics, first responders, and other professional incident managers.



Image courtesy of Vital ID

**Dr Treive Nicholas is
Director at Vital ID.**

Knowing a few simple things about a person at an accident or when a medical condition arises can have a significant impact:

- Who is he/she?
- How do we contact his/her boss or supervisor?
- How do we contact his/her family?
- Does he/she have any significant underlying medical conditions that could help paramedics when managing the situation?
- Is he/she taking any medication?

As we know, efficient and effective management at the start of an accident or when a medical condition arises, promotes the possibility of a positive outcome in the longer term.

Incidents like Bob's are happening worldwide in construction, on industrial plants, in factories, offices, railways, oil/gas sites, anywhere in fact. They can involve employees, contractors, lone workers, and teams. It's a pretty ubiquitous situation.

The Risk Management Toolbox

As I have illustrated, Personal Emergency ID should be viewed as an important component in the risk management toolbox, both operational and strategic for health and safety professionals in the Construction industry. At one level, ID is a low-cost tactical operational tool helping first responders at an incident, as well as simply helping with identification of workers day to day. In addition, use of Personal Emergency ID can be used to



Images courtesy of Vial ID

demonstrate best practice and proactive safety management when negotiating insurance premiums. Where the ID adheres to PPE, this can promote greater ownership of their equipment.

Implementing Personal Emergency ID also has a strategic benefit. In particular, it helps raise the bar, raising the standard of health and safety expected in a workplace. Used to augment training and enhance procedures, it can help to reinforce the workplace safety culture.

Following on from this, workers can start to take greater personal responsibility for their health and safety as they have promote the use of Personal Emergency ID themselves, without the intervention or coercion of the health and safety team. As a simple and effective part of the risk management toolbox, Personal Emergency ID can help to deliver a win-win for workers and their organizations – protect their people and their reputations.

Types of Personal Emergency ID

While there are many types of Personal Emergency ID, the main division is between those that are low tech and those employing some form of electrical device, scanner, telecommunications device, or chip. Outlined below is a cursory look at the options and some of the principal constraints you need to be aware of when weighing up which might work best for your health and safety regime.

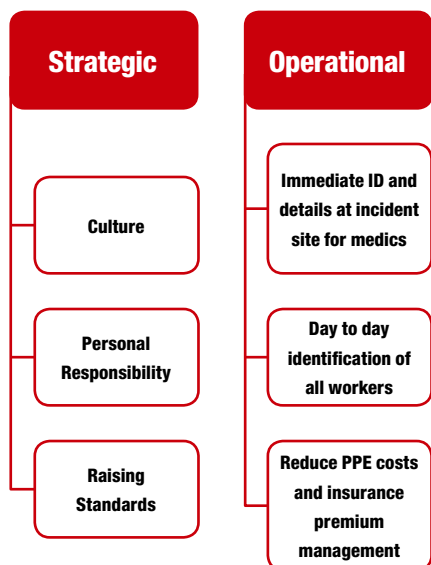


▲ Use of specifically manufactured paper prevents ink running when it gets wet.

Low tech

If we consider for one moment the low-tech Personal Emergency ID options, they cover a spectrum of devices, from dog tags to hand-written ID cards, wrist bags, and ID that adheres to hard hats and other PPE apparel. Their principal benefits are that they are low cost and can be accessed without the need for a computer, a bar scanner, or access to a cellular network.

Simplicity is key here. In the event of an incident, first responders can quickly see a few key pieces of information about the incapacitated person. These options are independent of any technology. While these devices are simple and low cost, they must adhere to the C.A.R.R. principle to be effective:



- **Conspicuous** – Visible and clear what it is and where it is.
- **Accessible** – The information has to be retrievable and readable.
- **Relevant** – The information needs to be accurate, not necessarily voluminous.
- **Resilient** – It is resilient both to the weather and to a person's demanding work regime.

We need to take a balanced assessment of any potential downsides or negative perceptions associated with all risk management tools. Some of the most frequently asked questions or statements include these:

"I only need provide Personal Emergency ID for workers who have a medical condition or those who take medication."

- Personal Emergency ID is not just for people with a medical condition, but for anyone who may be incapacitated following an accident. You do not know who has a medical condition. Many workers choose not to reveal their medical condition or medication to employers or co-workers. Workers often are prepared to write their medical condition and personal information on an ID when they know it will be useful in case of an incident or emergency.

"What about my data security liability?"

- Ensure it is the workers' choice if and what information they to supply. Employers can reasonably insist that an ID includes a worker's name and contact details for their boss. Leave it up to individuals to supply what other information they want on the ID for use at the time of an emergency.
- This has to be the individual's choice, and it encourages their ownership of their own health and safety. A softer approach will achieve greater worker participation without compromising your compliance status.
- Most products have tamper-proof seals or a similar device to ensure the data is contained securely, keeping private data private. This way, it is seen only by the right people in the event of an accident or medical emergency.

"Where the ID adheres to a helmet, does the glue damage the helmet?"



▼ Specifically formulated adhesive eliminates damage to the helmet.

Image courtesy of Vital ID

- In the past this may have been an issue, but today, mainstream manufacturers have specifically formulated adhesives to eliminate this potential problem. Many helmet Personal Emergency IDs now stick to hard hats for long periods without compromising their strength.

"Where the ID uses ink and paper to hold information, how do I stop it getting wet and losing the information?"

Look for a Personal Emergency ID system that is waterproof. In the first instance, go for a product that prevents water entering the ID. In addition, check to see that the paper or card used inside the ID is specifically manufactured to prevent ink running if it does get wet. Use of a permanent marker pen/ink can help a lot, too.

High tech

Having Personal Emergency ID in the form of a memory card or chip means that quite detailed personal information can be stored and read, but is conditional on first responders and incident managers having access to a device that can read it.

Some products use bar and QR codes, which once scanned enable first responders and paramedics to access the breadth of relevant medical and non-medical information. Like the use of memory cards, this is very effective at providing detailed information, but it does

rely on people at the scene of an incident, or nearby, being able to use devices to do the scanning and reading.

Particularly for lone workers and those working in the field, some Personal Emergency ID include a tracking device so the workers can be easily located in the event of an incident. Many rely on the cellular network, so the race is on to find low-cost global solutions that use satellite networks to pinpoint someone's remote location and allow them voice contact using adapted smartphones.

Back to Bob

While this is by no means a comprehensive review, it should provide you with an introduction to Personal Emergency ID in the workplace, along with the strategic and tactical benefits you can expect to leverage and some of the solutions available to you for more detailed consideration. But, in the end, it comes down to our people and our teams.

When fire broke out that fateful Tuesday Bob didn't know that the decision of his health and safety manager only a few weeks earlier to implement Personal Emergency ID at his site would have such a decisive and positive impact on him and his family – which, I suggest, gives us all food for thought.



For more information, go to www.vitalid.com



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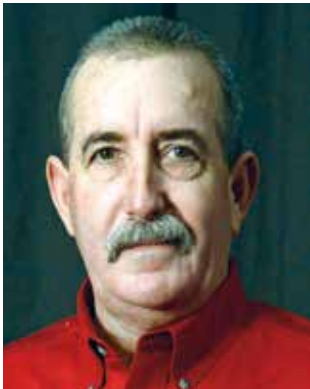
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Confined Space Rescue Operations

Rescue operations place special demands on the Emergency Response Team (ERT). The ERT must balance the complexities of site management with the intricacies of victim management to stabilize an effective and efficient manner while maintaining the safety of responding personnel.



James Hyles

Every situation presents unique challenges that can be overwhelming without a methodical, pre-determined series of response actions designed to guide the officers' thought processes and decision-making. The environment and victim condition(s) demand different strategies, and the first arriving officer's responsibilities include staging, size-up, and identifying response options. Officers must survey the scene by assessing the scope of needed rescue operations and safety precautions, while identifying available resources such as personnel, equipment, mutual aid, and agreements with private sector entities that include construction and demolition companies and hardware or lumber suppliers. Faced with this array of information, priorities, and options, officers must rely on incident management systems to direct their thought processes and guide their decisions.

▼ Various internal configurations and hazards.

Size up at any scene is the first step of evaluation that will determine the response action, and will continue throughout the response as changes in the environment, personnel, equipment, and victims evolve. Life safety is always the first priority to ensure minimal risk to the officer, response team members, and victims at the site. The first series of decisions is to identify the goals for the operation and the tasks required to accomplish those goals. The ultimate goals are rescue and life safety, but to determine the specific goals to accomplish rescue, information must first be collected about the location of victims and hazards in the environment, the nature of the victim's injuries, and the ever-changing nature of these mitigating factors. Information gathering includes observing the scene, talking to witnesses (and victims when possible), and determining their validity. Witnesses can provide crucial information, and officers will have a better understanding of the challenges they face, such as hazards or victims injuries, if they understand from witnesses how the scene came to its current configuration.

James Hyles is the Rescue Training Director for the Emergency Services Training Institute, a division of the Texas A&M Engineering Extension Service of Texas A&M University in College Station, Texas.



Image courtesy of James Hyles



Image courtesy of James Hyles

▲ Limited egress and vertical vessel.

Confined spaces present a variety of hazards to rescuers, many of which are obvious. The space may have limited entry and exit; there may be equipment such as motors, gears or agitators that hinder movement and could cause physical harm; it could contain grain, water, or other material that could shift and engulf the rescuer (the second-leading cause of death in confined space); or it may be poorly lit, have slippery surfaces, or impede communication between rescuers. But it's the hidden dangers that are the most threatening and the easiest to forget or ignore.

Every confined space should be considered dangerous until proven otherwise and precautions are taken to mitigate the potential hazards. Asphyxiation is the leading cause of death in confined spaces because the atmosphere is easily corrupted and atmospheric hazards are impossible to detect without monitoring equipment.

Rescuers often rely on their senses to

evaluate and identify hazards, a practice that is fundamentally flawed. Even when the physical senses may detect atmospheric hazards, the contact necessary for detection alone is often fatal. The only safe and reliable means for testing the atmosphere of a confined space is to use equipment designed for that purpose, and training rescuers to use the device.

Proper atmospheric testing requires deliberation and care. Approximately one-third of all confined-space fatalities occur after the space has been tested and determined safe for entry. Quick tests at the point of ingress are insufficient.

Above all, proper and regular training equips rescuers with the presence of mind to apply calm mental calculation to any rescue incident. Rescue scenes often are cluttered and confusing, and can present responders with a rush of information that can be overwhelming without a clearly established plan. Rescuers often fall prey to the idea that time taken to think through the operation is lost time, but without adequate understanding of the dangers imperiling the victim, the rescuer risks becoming a victim.

Confined space incidents demand a

systematic approach from rescuers, who must proceed carefully through the phases of recognition, evaluation, and control. This involves not only rescuers interviewing witnesses about the equipment and conditions that led to the situation at hand, but assessing the perimeter to determine which hazardous conditions can become immediately dangerous, identifying which conditions may be deteriorating or capable of deteriorating, and taking steps to secure the area against all of these threats.

Once the area around the confined space is secured, rescuers can begin to assess the space itself by analyzing the configuration of the confines; identifying products that may be stored in the space, as well as any mechanical or structural hazards the space presents; and locating important documentation such as entry permits and checklists, hot work permits, Material Safety Data Sheets (MSDS), and a diagram of the space. As with the perimeter, the stability of the confined space must be ensured, and the responders must make sure the proper personnel and equipment are on scene for the operation.

After all of these efforts to secure the scene and protect rescuers, responders must finally stop and determine if their precautions and risk mitigation are enough. If not — and this is a decision responders are reluctant to make — operations may need to shift from rescue to recovery.

A successful rescue operation depends first on the degree to which the rescuers have been trained to recognize on-scene hazards, to evaluate them and their impact on ensuing operations, and to control the scene's variables for the protection of all personnel. All of this precedes the actual efforts to gain access and stabilize, package, and extricate the victim.

Only training can equip the rescuer with the mental tools that enable methodical, careful analysis of the scene to override rash action. Only training can equip the rescuer with the knowledge to take full advantage of the life-saving monitors and equipment available to them. And only training can provide the rescuer the patience necessary to remember that the conditions that overcame the victim can, and will, overcome the rescuer without diligent attention to life safety.



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To this end, one focus of the DSTO research program is to provide protection for individuals from unavoidable CBRN hazards. Current CBRN individual protective equipment (IPE) provides high levels of protection for long periods of time, having been designed to meet requirements originally perceived for military cold war threats. These garments impose a high thermal burden on the wearer, and can constrain user functionality and mobility. As such, user workloads are reduced and mission completion times are increased.

Reducing the burden associated with CBRN protective clothing would improve mission outcomes in a CBRN environment. As such the DSTO focus is to provide greater operational ability, to optimise the balance between protection and burden.

What do we mean by low burden? Burden can mean ergonomic/system integration/thermal/situational awareness. All are affected by CBRN IPE and there is traditionally a trade-off between protection and burden. For example,

high protection is relatively easily achieved in Level A Self Contained Breathing Apparatus (SCBA) equipment, but users can only operate for a short period of time. Current military CBRN IPE allows users to work for longer than Level A equipment; however CBRN ensembles still provide significant impediments to operational capability when compared to standard uniforms. Particular issues include reduced heat transfer ability through wearing heavy, bulky over garments, over boots which are cumbersome, bulky gloves which reduce tactility for fine motor tasks, and respirators which reduce field of view and communication ability. Functional requirements for low burden IPE garments can be defined as: light weight, low thermal burden, ease of movement and low bulk materials.

Modelling of current scenarios shows that high challenge levels are still possible, however exposure to these high concentrations is likely to be for short periods of time, for both military and civil response users. Longer term protection,

if required, will be against much lower concentrations. Additionally, CBRN IPE has historically focussed on liquid and vapour threats, and the inclusion of aerosol protection would improve protection for users.

These changes in scenarios have caused DSTO to reflect on user requirements for IPE and to articulate what low burden IPE means in the current and future environment. This has allowed DSTO to develop a clearer understanding of the requirements for modern IPE and to develop innovative programs for delivering low burden IPE through the application of novel materials. This two pronged attack allows DSTO to focus on the delivery of low burden IPE with both a requirements focus: what does the user need to be able to do their job effectively; as well as from a science perspective: what is achievable and possible from IPE fabric and materials systems. Combining this holistic approach

▼ Decontamination training,
Royal Australian Air Force, Amberley.



Image courtesy of the Defense Services photo gallery

► Training preparation for military engineers with basic personal protective kit.



Image courtesy of the Defense Services photo gallery

with high value test and evaluation capabilities allows DSTO to deliver high quality research into low burden IPE solutions for the ADF, an approach easily transferred to civilian first responders.

To produce effective low burden IPE that provides a significant improvement on current ensembles in terms of thermal and operational performance, fundamental questions need to be answered:

1 What are the likely dermally relevant challenges that users might experience?

Using plume dispersion models, like the US-developed Hazard Prediction and Assessment Capability (HPAC), with inputs from meteorological data, urban models and terrain models DSTO can predict the results from specific outdoor CBRN releases. The data generated includes the extent and spread of the challenge, how it spreads in the environment, what proportion of the contaminated area has “high” or “low” concentrations and how long the hazard remains in the environment. The HPAC plume modeling provides a predicted average value for outdoor releases.

Dispersion modeling can also be used to predict challenge levels for indoor releases. The models used generate a timeline, which demonstrates that concentrations experienced at a single

location are often highly variable. The maximum concentration achieved and the length of time that high concentrations persist are more important than simple average values when it comes to determining the protection required for people exposed to that environment. Using time resolved protection requirements allows DSTO to tailor the protection provided by the protective materials, optimizing protection.

2 Concept of operations: how long must users remain in IPE, endurance requirements, and work rate requirements

By combining the CBRN challenge predictive capability with war gaming (operations research) detailed effects on the user population can be determined. This is extremely useful for performing trade-off studies such as determining appropriate protection levels required, and what levels of heat stress might cause missions to fail. This allows DSTO to test

scenarios which are difficult or impractical to assess with field trials, and feeds back valuable information about protection requirements and thermal burden trade-offs in scenarios that users could be expected to experience on the ground. It also allows DSTO to target physiological experiments to provide the best data available with minimal resources.

Once these questions have been answered, this defines what the users need or desire. Within the limitations of current technology DSTO (and more broadly Defence) then has a clear basis from which to develop requirements for low burden IPE that can provide a significant improvement in capability for users.

A parallel approach is to take scientific concepts and determine how effective they are at providing protection; this allows scientists to take innovative approaches to solve the problem. For example for IPE material concepts: if we make a fabric with particular properties what would it look like? How well will it provide protection? How well will it perform in an operational

Science driven concepts allow us to determine where the knowledge gaps are. With specific designs, how would we make them work, what future investigations for different components are needed?



◀ CBRN training exercise debrief, military engineers.

New evaluation systems

Being able to effectively measure the protection and performance provided by low burden IPE is critical to its success. To that end, DSTO has a suite of tests available to measure the performance of IPE. We can effectively measure the relative thermal performance of different IPE systems through fabric swatch testing, and thermal manikin testing to evaluate expected thermal burden and translate this information into the loss of capability or functionality for the user. Chemical protection capabilities of the materials can be tested in purpose built facilities against target chemicals of interest. However fabric swatches only provide part of the story, as extremely effective fabrics do not make extremely effective suits unless the design is right and closures and seams minimise leakage gaps. DSTO's manikin test facility is currently being validated and will provide system level detail on the protection capabilities of suit systems and integration of IPE.

Current international best practice systems testing of this type measures end point skin exposure values, which provides the cumulative results of leakage under the suit at different points on the body across the entire program of manikin movements. DSTO has developed real time breakthrough measurement capability that allows scientists to monitor vapour challenges breaking through the suit, and to correlate the break through events with particular movements or exercises. This capability will add to the available data to determine causes of suit failures from either fabric, suit design or system integration issues.

The combination of fabric swatch testing and manikin testing for chemical and thermal performance provides DSTO with the ability to assess different IPE suit systems in detail, and to determine if IPE systems meet requirements. These results, combined with modelling of use scenarios allows DSTO to deliver advice on the most effective equipment combinations to optimise the trade-off between protection and thermal burden effects of CBRN IPE.

➔ For more information, go to www.dsto.defence.gov.au

environment? DSTO can evaluate the gain in performance versus the protection and how this compares to those options generated from the requirements studies.

Science driven concepts also allow us to determine where the knowledge gaps are. With specific designs, how would we make them work, what future investigations for different components are needed? What is possible, what is improbable/too far-fetched?

Two different developments at DSTO highlight laboratory work which showcase the requirements driven (systems testing) and science driven (novel materials development) aspects of our work.

Novel Adsorbent Fabric

DSTO is investigating an innovative nanofibre membrane concept as an alternative to activated carbon

cloth/skrims in protective clothing. In current technology suits, combined aerosol and vapour protection can only be delivered through air impermeable membrane materials which cause significant thermal burden. DSTO is investigating a lightweight aerosol filtration membrane made from nanofibers. These nanofibers are generated with adsorbent media inherently embedded in the fibres, to provide protection against vapour challenges.

Proof of concept work has shown that this composite membrane can successfully remove vapour and aerosol challenges from the airstream, while providing some air permeability. DSTO is now advising the Defence Materiel Technology Centre on the progression of this technology from the research concept stage.

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Inside Task Force Tips

The month of June saw a very busy trade show schedule for the team at MDM Publishing. The “silly season” of events started with Interschutz in Germany followed immediately with Firex in London and then straight across to Chicago, USA for the NFPA Conference.



Mark Bathard

Indiana based Task Force Tips made their presence known in Germany and in Chicago with their range of firefighting equipment. Following the NFPA Conference I decided to see for myself how this family orientated business has grown from strength to strength by visiting their offices and factory in Valparaiso near Chicago.

Task Force Tips Inc. was conceived by founder Clyde McMillan in 1968 who was a fire chief with the Gary Task Force Civil Defense Fire Department in Indiana. He came up with the idea of an automatic nozzle and made the first design on a napkin, this was the birth of TFT and manufacturing began in the basement of the family home.

Fast forward to 2015 and Clyde's son Stewart is at the helm of the company and along with the 300 plus workforce,

◀ The original napkin with Clyde McMillan's drawing.

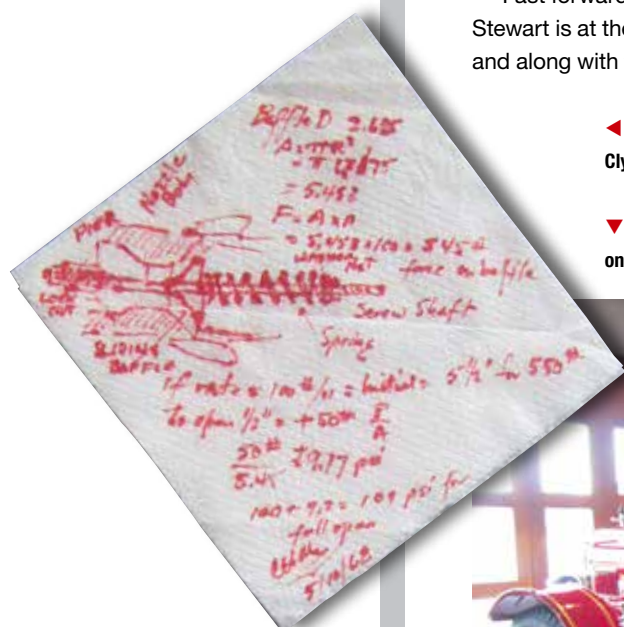
▼ One of three vintage fire apparatus on display in the TFT museum.



▲ The impressive facade ensures visitors are left in no doubt about TFT's heritage.

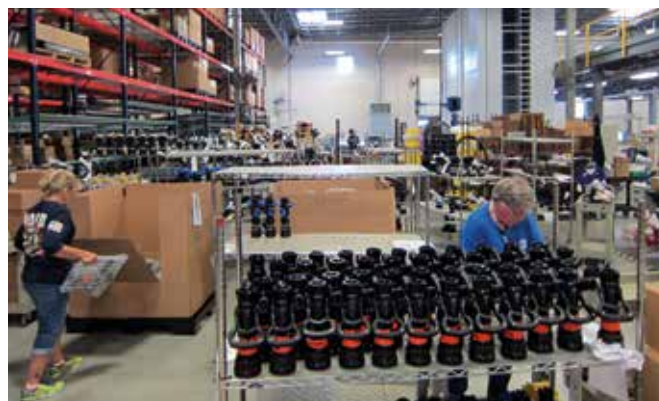
has been instrumental in making Task Force Tips one of the world's leading manufacturers of firefighting equipment.

This was my second visit to TFT, the last visit being in 2002 when the company was at its previous premises at Evans Avenue, Valparaiso. The sheer difference in size to Evans Avenue compared to the new facility is truly astonishing and just proves how innovative TFT are as a company.



Mark Bathard is International Sales Manager for MDM Publishing. Mark has been involved with the fire publishing industry for over 21 years.





▲ Clockwise from above: State of the art robotic technology ensures TFT remain at the forefront of quality and innovation. TFT fly the national flag of visitors to the plant at the front of the facility. Following thorough testing and inspection TFT products are carefully packaged prior to dispatch.

The first thing you see on entering the TFT facility is the facade of a firehouse which is where the company's own museum is located. This has been pieced together meticulously and offers visitors the chance to see items of firefighting memorabilia throughout the decades.

This is all overseen by TFT's own curator and is definitely a worthwhile visit.

The facility on the rather aptly named, Innovation Way is considerably larger than the previous plant on Evans Avenue and there are already plans in place to increase and utilise floor space so as to increase output and make TFT more efficient. One of the current projects is a new mezzanine flooring area which when completed, will add hundreds of square feet in the despatch area to make loading and unloading, packing and mailing more efficient. This new area has been fitted with the latest in lighting technology which

is controlled by movement so that lights only stay on for a designated period of time when required thus saving energy.

Keeping the workplace clean is a very important part of TFT's ethos, every Friday the workforce down tools and spend an hour before the end of their shift to ensure that the factory floor and workstations are in pristine condition. From the initial delivery of raw materials to the final stages of manufacture the process is so incredibly efficient. TFT's ongoing investment in their workforce, machinery and research and development just proves that they will remain the market leaders for decades to come and firefighters all around the World will feel safe in the knowledge that the equipment they are using has been tried and tested and will get the job done.

The welcome and hospitality shown by the team during my visit was incredible and I would like to thank TFT for making this possible.



For more information, go to www.tft.com

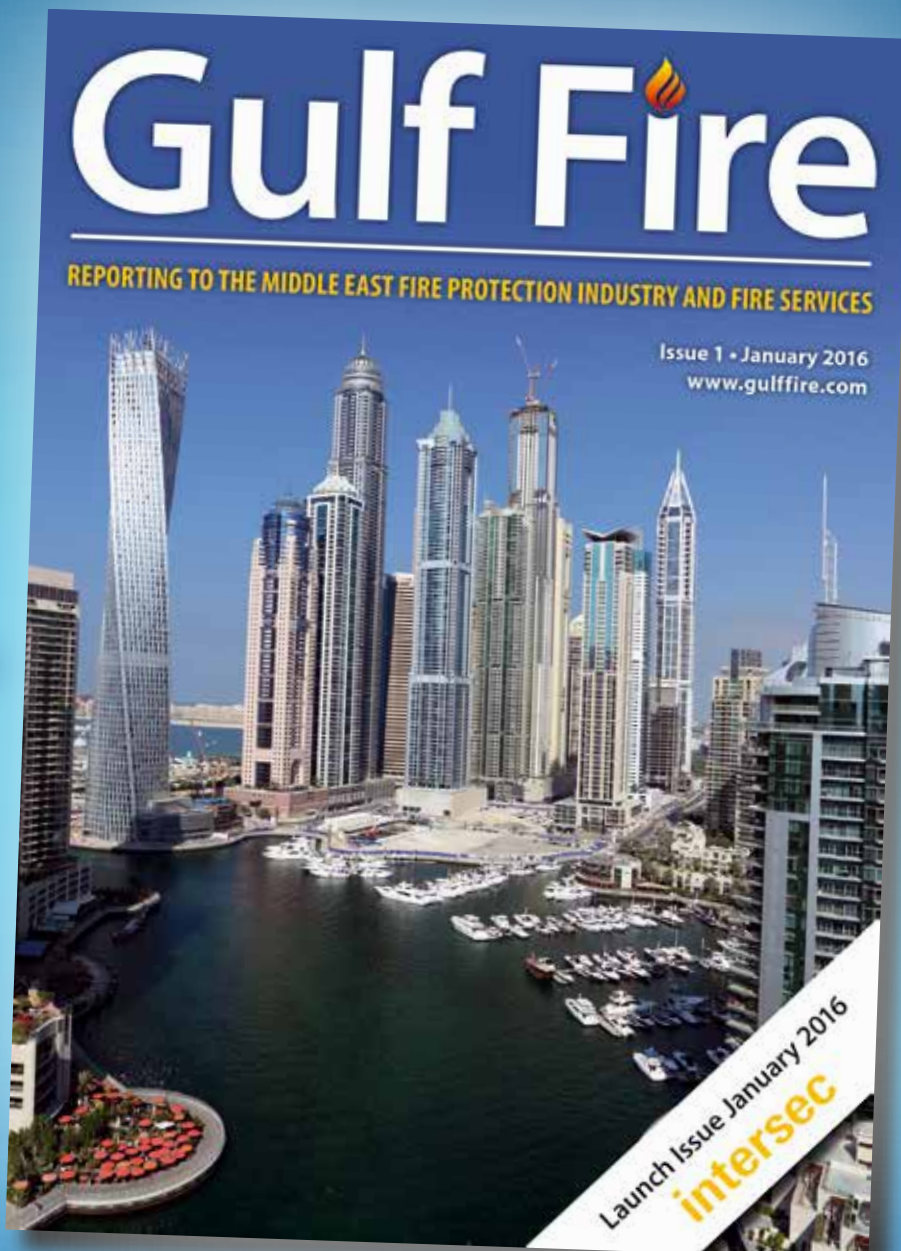


◀ The ultra modern and spotlessly clean facility is a credit to the company and its dedicated workforce – the new mezzanine can be seen on the right of the image.

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Introduction

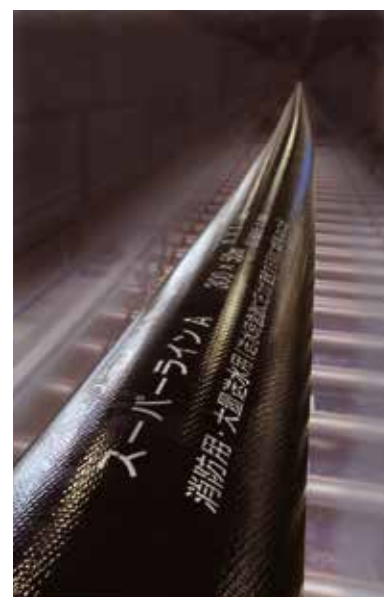
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Johan Lindström is a Project Leader at SP Fire Research. He gained his Fire Protection Engineer degree in 2010 at Luleå Technical University, Sweden.

Johan's main interest field is First Responders, extinguishing systems and operational collaboration at large accidents.

Peder Lindström of SP Fire Research.

Petter Backlund of Fire and Rescue Greater Gothenburg.

The first responders face new situations that they are not familiar with and have to make decisions that they are not trained for. The lack of education and experience may have consequences on the society due to which kind of decision that was taken.

On today's biogas-powered buses, the gas tanks are equipped with temperature fuses to ensure that the vessels do not explode due to the increased pressure resulting from heating of the vessels. The temperature fuses activate when the temperature passes about 110 degrees Celsius. This means that all of the gas is released at a high pressure out to the surroundings. In most of the known cases where CNG buses has caught fire the temperature fuses has worked in a correct way and the gas has been ignited when leaving the vessel causing a massive jet flame. However, Lionel Perrette and Helmut K. Wiedemann describe in their article Safe Storage of Natural Gas on Urban Buses: Case Early Investigation and Learnings three different fire incidents where the fire has led to explosions of vessels. The reason for these explosions was not the failure of the temperature fuse. The vessels exploded when they were heated on a single spot that did not affect the temperature fuse. One question that has to be raised is if the only problem with biogas-powered busses is fire in the vehicle with risk of explosions or massive jet flames? What happens for example if the bus is involved in traffic incidents where the gas system in some way has been damage and a leakage has occurred? For the last years in Sweden, several traffic incidents has happened where the gas system on the bus has been damaged and the rescue leader has been afraid that leakage has occurred. Then a decision needs to be taken, but it is not always obvious what decision would be the correct to take.

Biogas-powered bus traffic incident in Gothenburg

In June 2013 a traffic incident occurred in the central parts of Gothenburg. Involved in the incident were one personal vehicle and the CNG (Compressed Natural Gas) bus shown in Figure 2. As shown in Figure 2 the personal vehicle had only touched the bus in the front. The damage on the bus could only be seen as small buckles and discoloration under the front window. What differed this incident from an "ordinary" traffic incident was that the bus had its CNG fuelling nozzle and a manometer placed in the front, and the manometer had been damaged in the collision, causing a small leakage of natural gas. The risk with leaking natural gas is that the gas is easy to ignite and have a flammable range from 4 to 16 vol %, causing a large explosive area if leakage occurs.

The rescue leader from Greater Gothenburg Fire & Rescue Services gave initial orders to close all the nozzles on each gas cylinder to stop the flow of gas. After one hour the gas flow had not stopped. The rescue leader was thinking about following three choices:

- 1** Keep the closures (150 m) and wait until the cylinders are empty. This would take about 4 days. High risks with the central location in Gothenburg, all surrounding buildings and the infrastructure.
- 2** Empty the cylinders by removing each nozzle. Also high risks with the central location in Gothenburg, all surrounding buildings and the infrastructure.
- 3** Towing away the bus to a safer area and then empty the cylinders. High risk to ignite the leaking gas with sparks from the tow truck.

Due to high risks with all these three choices the decision was to disconnect as much electrical device in the bus as

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Image courtesy of Fire and Rescue Greater Copenhagen

possible and drive the bus with the ongoing leakage in the front out of the city to a safe place and then empty all cylinders. This decision had effects on the society by having a closure of 150 m in the city for a few hours, and the traffic was stopped for a short time when the bus was driven out of the city. The incident commander was thinking in terms of following events due to the nature of each decision alternative. Other decisions could have had huge consequences on both the infrastructure and the general public. Due to the complexity in the society and in technical systems (in this case biogas-powered bus), it is more and more important to think in terms of escalating consequences when the incident commander selects what kind of decision he/she will make. This kind of escalating consequences can be called cascading effects, i.e. one incident starts and a chain of subsequent events follows. Depending on what kind of decision the incident commander makes, the chain of subsequent events can take different turns. One simple example of explaining this is a fire at a car repair company. In the building gas cylinders are stored for welding equipment. The rescue leader takes the decision to evacuate the area

and keep the enclosure for 24 hours according to recommendations where gas cylinders are involved in a fire. Next to the car repair company is the highway and railway; these are also closed for 24 hours. The stop in the railway and highway system has huge consequences on the society.

Cascading effects

Modern socio-technical systems are increasingly characterised by high degrees of interdependencies. Whereas these interdependencies generally make systems more efficient under normal operations, they contribute to cascading effects in times of crises. Therefore, challenges for emergency preparedness and response are growing significantly – challenges which are more and more relevant to both natural and manmade emergencies and are reinforced by the risks for cascading effects in complex emergency management environments. In particular complex environments which lack adequate resilience to certain initiators will be prone to cascading effects. An escalating incident in such an environment can lead to severe cascading effects and quickly become extremely difficult for emergency services to handle. The incident can

▲ Driving the bus with ongoing leakage to a place of safety.

ultimately have enormous consequences with respect to life, property and the environment and for both infrastructure and the general public. These consequences can in many situations have both direct and indirect effects, not only in the immediate surrounding geographical area but also across very large areas, potentially extending across borders.

The EU-project CascEff

SP Fire Research is coordinating the EU-project CascEff and performs the work together with 10 other partners from Europe. In CascEff four of the main objectives are:

- 1 Better understanding of the cascading effect in crisis situations.
- 2 Develop an Incident Evolution Tool for predicting past, present and future crisis evolution leading to cascading effects.
- 3 Identification of human activities in the crisis.
- 4 Improved incident management for present and future threats.



▲ CNG bus involved in the accident. Orange arrow showing the position of leakage.

▼ Leakage of gas from the manometer.



CascEff will improve our understanding of cascading effects in crisis situations through the identification of initiators, dependencies and key decision points. These will be developed in the methodological framework of an Incident Evolution Tool which will enable improved decision support, contributing to the reduction of collateral damages and other unfortunate consequences associated with large crises. Use of the Incident Evolution Tool will be validated through its implementation into different incident management and training platforms representing different end users in the project (e.g. NoKeos, iCrisis, RIB, WIS and XVR). A roadmap for similar implementation in other incident management and training platforms throughout Europe will be defined to allow broad acceptance of the Incident Evolution Tool.

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1



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Innovations in Breathing Apparatus – Fit for Operational Effectiveness

Breathing apparatus (BA) has come a long way over the years. Some things however never change. Without breathable air, the danger to life is extreme and immediate. The use of self-contained breathing apparatus (SCBA) is therefore absolutely essential when it comes to keeping firefighters safe.



Martyn Lamb

Martyn Lamb specialises in the fire service segment at Dräger. Based between Dräger's Blyth and Hemel Hemstead sites, he has responsibility for UK product portfolio management on new products and services for the fire and rescue sector.

Before it, early firefighters – often referred to as ‘smoke eaters’ – had to face the deadly effects of inhaling smoke and carbon monoxide with little or no protection, risking their lives every single day.

Safety specialist, Dräger, has been at the forefront of breathing apparatus innovations for the past 125 years and continues to pioneer advances in technology designed to protect firefighters around the world.

This article looks at some of the key moments in the development of SCBA through the ages and considers the future of this vital piece of safety equipment.

An essential piece of kit

Without a doubt, SCBA is one of the most important pieces of personal protective equipment a firefighter on the front line wears. The equipment has the ability to protect against serious injury across the variety of different hazardous scenarios a firefighter faces on a daily basis.

Its overall purpose is to protect the wearer and ensure they breathe safely in an otherwise irrespirable environment – and it is one of the main risk control measures employed by brigades around the world.

As a result, through time, there has been a need to constantly innovate and develop in line with shifting Health and Safety regulations and increasing user expectations.

When it comes to breathing apparatus and the systems behind them, innovation never stops. New developments continue to be made as the fire industry moves forward; incidents require new tactics and firefighting procedures change.

Innovations through the ages – putting the user first

Breathing apparatus has a history of innovation which takes into account the many considerations around firefighter safety. As a safety manufacturer which upholds ‘Technology for Life’ as its guiding philosophy, Dräger has been at the forefront of many of these changes.

Fire service folklore recalls the days of firefighters growing long beards to help them breathe in smoke and thankfully, BA innovations have come a long way since then.

The history of breathing apparatus is long and varied – from the 1904 introduction of the first reliable BA set, with a service life of up to two and a half hours, to the modern day launch of the telemetry in 2001.

The needs of the wearer have always played an important part in BA innovations, as it is vital safety is never compromised. Comfort remains a key requirement as this can have a major impact on a firefighters’ ability to work safely and effectively.

As a result, comfort has been recognised through innovation for many years. For example, the Dräger model 1924 breathing apparatus was designed to be worn with a face mask, replacing the uncomfortable method of breathing inside a helmet.

Because of its weight, SCBA can put strain on the individual user causing fatigue, and, depending on cylinder capacity and the accessories used, SCBA has the potential to be heavy. As firefighters are regularly involved in strenuous activity, developments in lightweight equipment are particularly important.

In 1929, Dräger developed light metal cylinders for respiratory protection and by 1998, technology had advanced to launch the lightest weight carbon composite

cylinders, manufactured out of its Blyth, Northumberland plant – itself becoming the centre for excellence in BA manufacturing in 1980.

Wear and tear is another key consideration – particularly when thinking about the life-span of the equipment and cost implications for fire brigades. The introduction of state-of-the-art harness materials, moving from textile covered foam to a closed-cell rubber harness – specially designed to withstand the high level of impact on a daily basis – means today's equipment is more suited to extended wear and frequent use.

Resistance to chemicals found today is also very important, meaning less time away from being decontaminated by specialist cleaning service providers.

Pioneering new ground

Dräger breathing apparatus has also played a big part in ground-breaking historical milestones over the years, including the 1913 world altitude record for aeroplanes, set with the help of Dräger high-altitude breathing apparatus.

In 1931, oxygen devices developed by Dräger allowed Dr. Auguste Piccard to become the first person to fly into the atmosphere using a gas balloon.

And, Dräger BA sets helped the first men to reach the summit of Mount Everest in 1953. Sir Edmund Hillary and Tenzing Norgay reached the top of the world's highest mountain, with the support the company's breathing technology.

State-of-the-art solutions for a new era of firefighting

The BA of today is now more advanced than ever before and there are more options available to firefighters, according to their individual needs.

Technological advancements have enabled companies like Dräger to invest in state-of-the-art new techniques. The innovative pressure mapping technique for example, has created an optimised design which works around the human form. It identifies key pressure points and uses advanced motion analysis techniques to help visualise how objects move in relation to each other, improving the harness positioning on the latest Dräger designs and giving the wearer comfort and stability.

One of the biggest issues faced by firefighters wearing breathing apparatus is communicating effectively whilst in

Timeline of Dräger BA innovation

1889 – Patent for Lubeca valve delivered to Johann Heinrich Dräger, making it possible to control the removal of carbon dioxide from high pressure cylinders.

1900 – Oxygen supply device for high-altitude flights developed.

1904 – Model 1904/09 is the first reliable long-term BA kit, with service life of two hours.

1913 – World altitude record for airplanes is set with the help of Dräger high-altitude BA.

1915 – Dräger goes into mass production of respiratory protection masks in Germany.

1924 – The model 1924 BA can now be worn with a mask, replacing the uncomfortable method of breathing inside a helmet.

1929 – Dräger light metal cylinders for respiratory protection are developed.

1931 – Oxygen devices developed by Dräger allows Dr. Auguste Piccard to be the first person to fly into the atmosphere using a gas balloon.

1953 – Summit of Mount Everest is reached for the first time by Sir Edmund Hillary and Tenzing Norgay with the support of Dräger breathing technology.

1953 – The PA 34 and DA 59 self-contained breathing apparatuses are developed.

1965 – Breathing apparatus manufacture moved from Germany to Blyth, Northumberland, UK.

1965 – Plastic high pressure gas cylinders are developed.

1966 – BG 174 BA using 200 bar cylinder pressure is made possible by the use of high alloy steels.

1969 – Dräger is the first company to use 300 bar technology self-contained breathing apparatus.

1969 – The Model PA 54 becomes the European standard.

1975 – PA 80 becomes SCBA international standard and the Panorama Nova full facemask is developed, combining comfort and quality. This is still one of Dräger's most popular respiratory protection masks.

1980 – Dräger in Blyth, Northumberland, becomes the centre of excellence for BA manufacturing.

1992 – PA 94 SCBA and Futura respiratory protective masks are launched.

1997 – Draegerman PSS 500 SCBA is launched and the PA 93 Plus, developed in Blyth, Northumberland.

1998 – Draegerman PSS 100 SCBA is launched. Carbon composite cylinders developed in Blyth.

2000 – The first Merlin telemetry prototype and LDV developed in Blyth, Northumberland.

2001 – PSS Merlin telemetry board is launched which provides an overview of those wearing respiratory protective devices, thereby increasing safety.

2006 – Bodyguard 7000 is developed in Blyth, Northumberland.

2008 – Bodyguard 1000 and PSS 7000 developed in Blyth, Northumberland.

2010 – PSS 3000 and PSS 5000 SCBA are launched and the Merlin telemetry modem is developed in Blyth, Northumberland.

2013 – The integrated wireless variant of the Bodyguard 1000 ADSU, the Bodyguard 1500 launches to the market.



which has been welcomed by brigades, who trust that their workforce is well looked after. Remote monitoring through the telemetry system means teams can react immediately in the event of an emergency.

One of the key aims for Dräger within the context of the fire service, is offering Fire Authorities a total system solution where the total sum of the parts equates to the safest possible solution for firefighters. All the elements need to fit together with precision giving firefighters the ultimate protection in every situation, whilst demonstrating cost efficiencies.

The breathing apparatus of tomorrow will continue to be driven by technological advancements, user needs and regulatory changes. With chemical, biological, radiological and nuclear concerns in today's society, firefighters must be equipped to face a range of different hazards. New standards are being implemented regularly around the world.

As the sector continues to face new challenges, continuous innovation means that whatever the future holds, firefighters will be fully prepared for any situation they may face.

 For more information, go to www.draeger.com

a hazardous situation – heightened by the number of well-documented communication failures through the years and missed messages contributing to firefighter fatalities. Often, a fire scenario will take a firefighter out of sight and communication and monitoring plays a vital role in protecting teams on the front line.

With many years' technology behind it, Dräger has developed the advanced PSS Merlin System to support the needs of firefighters and it is currently the only telemetry system in operation within the UK fire sector. The system is a fully automatic, electronic breathing apparatus monitoring system, designed to enhance the safety of the firefighter during active firefighting duties, maintaining a disciplined entry control procedure and the accountability of all team members.

The system goes hand in hand with its Bodyguard 7000 – an electronic monitoring unit which provides continuous monitoring of personal information and operational status, including most importantly an accurate calculation of remaining air time which is updated every second and is based on current air consumption. An integrated system, designed with optimum comfort at the forefront, is then shared and monitored via the Entry Control Board, allowing the BA Entry Control Officer to monitor the exact status of up to 12 individual team members. Used alongside the new Merlin PC Modem, user monitoring has advanced from single Entry Control Point to the monitoring of an entire incident.

As a result of innovations like these, the concept of improved safety is one



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Training Simulators: Risk-Free, Realistic and Programmable

Today, simulators are being used in an ever-increasing number of areas, particularly when real-life training would be overcomplicated, excessively expensive, ecologically untenable, or simply too dangerous. Emergency responses by the fire services most definitely fall into this category.



Markus Zellinger

With this in mind, Rosenbauer is an example of a company that has considerably expanded its driver training range. Apart from the Panther tactic simulator for airport fire services, which has been in successful use for a number of years, a system for municipal firefighters called the Emergency Response Driving Simulator (ERDS) has now been put into operation.

Both systems facilitate the risk-free and highly authentic training of conduct in particularly problematic or unusually dangerous and stressful situations during the drive to an operational scene. Moreover, due to the latest technology, the simulators also offer absolutely realistic handling and surroundings that are accurately represented down to the smallest detail. This allows the training of widely divergent response drive scenarios in order that, above all, the correct reactions in critical traffic situations are learned. Simulator training enables fire truck equipment operators and drivers

to obtain routine in those situations, which for the reasons already mentioned cannot be practiced on the road.

Hundreds of Scenarios

Training drives using the ERDS can be designed in a highly individual manner. As soon as the driver switches on the blue light and the Martins horn, the rest of the traffic reacts to the special rights of the emergency vehicle. Every type of weather and sudden changes in conditions can all be emulated, as well as differing light levels and night driving in fog, for example, increasing danger of black ice, operations with differing payloads such as an outward trip with full extinguishing agent tanks and the return journey with empty tanks.

In addition, the reactions of other road users can be integrated into the training. A child that suddenly runs into the road; a cyclist, who when turning, disappears into the driver's blind spot; a bus that leaves a stop without indicating, as well as ill-disciplined drivers in front of a red light or in a jam who suddenly close the emergency corridor. Furthermore, the truck driver's own conduct can be analysed with regard to errors such as turning without indicating

▼ The system has the ability to provide multiple scenarios.



Image courtesy of Rosenbauer

Markus Zellinger is Head of Training at Rosenbauer.


Image courtesy of Rosenbauer

▲ **Student and instructor undertaking post-training review.**

because the vehicle is being driven with blue light. Simulator training represents special instruction, as the participants, who as a prerequisite must be able to drive a truck, learn how to react in exceptional circumstances.

Realistic Surroundings

The ERDS driver's cab is identical to a Mercedes Benz Actros with all the original controls and indicators, as well as automatic transmission. The imitation cabin is mounted on a moving platform fitted with three electrically driven spindle actuators, which means that the cab moves as if during a real drive. Jolting due to collisions with the pavement or vehicle movements, for example, due to lane changes are simulated accordingly and can be felt. The image of the roads and freeways, irrespective of whether in urban or rural surroundings, is projected onto the windshield and side windows, while TFT monitors replace the rear view mirrors.

At present, the ERDS offers 120 kilometres of rural roads with differing widths and gradients, bridges, underpasses and railway crossings. Another 60 kilometres, which run through various residential and industrial areas, are available along with 40 kilometres of freeway with access roads and exit slipways, tunnels, roadhouses and gas stations, as well as all the related signalling systems. These stretches can be combined at will along with the events/scenarios that have to be dealt with during the drive.

Driving and Extinguishing

While the ERDS serves operational response training, the Panther Tactical Simulator is used both for practicing the drive across the airport and the subsequent extinguishing attack. The grounds of the airport including the runways, access roads, apron, tower, arrival and departure lounges, and firehouses are shown in every detail. Any airport, complete with all its features, can be fed into the system along with various types of aircraft with the Airbus A380-800, Boeing 737, Boeing 747-400 and MD-11 available as standard.

As is the case with the ERDS, the road holding and handling of the Panther in the simulator alters in line with the payload and the surface. The extinguishing technology is guided by the original control elements and all the monitors (front, roof and extinguishing arm) are equipped for one-hand operation and able to emit all the extinguishing agents carried on board. First and foremost, the correct positioning of the vehicle for the extinguishing of a burning aircraft or engine is practiced, along with the choice of the correct extinguishing agent, the optimum throw distance and the precise manipulation of the piercing tool. The latter is employed to penetrate vehicle and container walls in order to extinguish fires from the inside. The operator can actuate a diversity of fire scenarios and smoke, flames, explosions and turbine re-ignition are all possible.

Cutting Edge Technology

The Panther simulator consists of an original cabin with an eight-metre diameter 210 degree projection surface in front

that has a height of four meters. The simulator also includes a separate instructor station from which the various operational situations can be programmed and the training guided. The projectors are fitted with edge blending software and produce a seamless and very bright panorama image measuring 56 square metres.

The driver is confronted head on by all the operational events on the huge projection surface. The two main mirrors are replaced by monitors and thus provide the driver with all-round vision. This means that when he or she looks out of the vehicle to the left, right or above, the surroundings are visible just as in a real operational response.

Stationary and Mobile Solutions

Rosenbauer offers simulator courses at both its training centre in Leonding in Austria and directly at fire services and other emergency organisations. The ERDS can be simply packed onto a swap body vehicle and then set up at the customer's premises. In addition to training from Rosenbauer's instructors, both simulators can be rented or purchased. For example, in June 2014, a Panther Tactical Simulator was put into operation at Kuala Lumpur Airport.

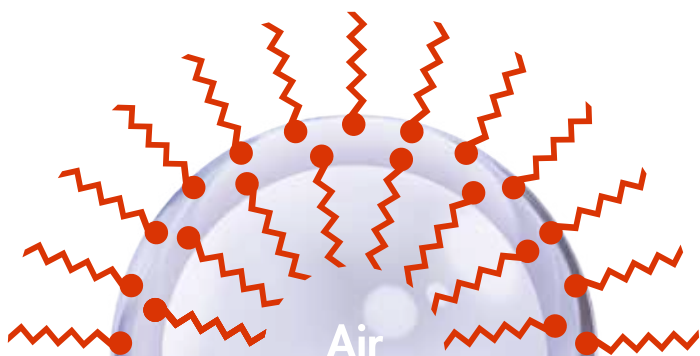
Basically, simulator training contributes to learning how to correctly assess dangerous situations and the rapid defusing of potential accident situations, the early recognition of the intentions of other road users and their accurate interpretation, the clearly recognisable expression of the driver's own intentions in traffic for others, the proper handling of stress during emergency responses and in the final analysis, a reduction in the number of blue light accidents.

The major advantage of simulator training lies in its lack of risk and capacity for reproducibility at limited cost. There is no wear and tear, extinguishing agent use, or vehicle damage even if accidents are frequent during the training phase. Moreover, most importantly, driving practice is obtained along with an intuitive ability to react quickly and correctly in situations, which as a rule can otherwise not be practiced.



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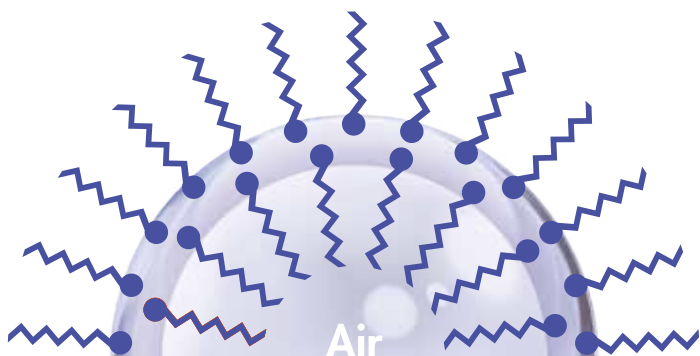
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Uncovering the Chemistry Behind the Forty-Year Relationship

As any firefighter will know, understanding the cause of fire is a crucial factor in identifying potential improvements in fire safety and prevention. The UK's fire brigades are the primary responders to chemical, biological and radiation incidents across the country and a growing number of fire brigades are turning to independent, scientific expertise to provide them with fire investigation support and technical advice. This article looks at the science behind the relationship between the global leader in compliance and London Fire Brigade (LFB), and the role it is playing in fire prevention and mitigation.



Steve Day

Steve Day is Technical Director for Bureau Veritas and has worked as a scientific advisor to numerous UK Fire & Rescue Services since 1983. Within his role he has been closely involved with a huge variety of Fire Brigade incidents, providing expert advice in dealing with hazardous materials and also in investigating the causes and spread of fires.

The need to investigate and determine the exact causes of fire is greater than ever before. In 2013-2014, the UK's fire brigades attended approximately 170,000 fires nationally. These incidents resulted in 275 fatalities and some 3,600 casualties. Yet, the impact of a fire goes beyond even human loss. The economic impact can be enormous too, with the cost to property damage, lost business, fatalities, injuries and legal issues estimated to be in the region of £8.3bn in England alone. Developing a greater understanding of fire and the causes behind it will help our emergency services and the UK's businesses to develop preventative measures to safeguard

against human and financial loss. And it is here that science is providing so many fire services across the UK with the answer, with brigades such as Greater Manchester, Merseyside, Essex, Kent and Hertfordshire – to name just a handful – turning to Bureau Veritas for expertise and support.

The UK's emergency services first recognised the importance of utilising scientific expertise as far back as the late 1960s, when Bureau Veritas and its predecessors started attending both major and minor incidents across the capital alongside London Fire Brigade. What started off as infrequent, ad hoc assistance has grown, decades later, into a close collaborative contractual working relationship between the two organisations. Today, Bureau Veritas offers round-the-clock support and technical advice to LFB, the busiest fire service in the UK.

▼ Bureau Veritas Fire Science department helps LFB to better understand the causes of fire.



Image courtesy of Bureau Veritas

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Expertise On Hand

It is the scientific expertise that is the very essence of the service that Bureau Veritas offers LFB. Using an independent third party organisation gives LFB access to a team of highly skilled chemists, as well as state-of-the-art resources and laboratories across the country. It also means that Bureau Veritas's fire science team of specialists can attend an incident alongside the Brigade's own team, where they can begin to carry out a full scientific investigation by selecting and analysing samples on the scene for further investigation at one of our laboratories.

At our purpose-built forensic fire laboratories, Bureau Veritas specialists can also help LFB to accurately establish the cause of a fire by using methods such as analysing burning behaviour of materials and the latest x-ray techniques.

Using x-ray is a useful means of helping to understand the cause of electrical fires, allowing identification of metal components within a sample of debris. Importantly, this technique is non-destructive and so helps to preserve all evidence.

Using x-ray can also help LFB understand more about household

appliances. This can include, for example, identifying any common faults among manufacturers or among particular types of appliance and establishing any common patterns. Indeed, the reports that Bureau Veritas has provided to LFB have even, on occasion, led to behavioural change amongst manufacturers.

Each investigation is followed by a detailed report to LFB outlining our findings, as well as any recommendations for fire safety improvements. LFB can then use this information to develop fire prevention and safety strategies; we may also work in conjunction with government agencies and organisations such as Trading Standards, Health and Safety Executive and Her Majesty's Coroners.

Using a third party to provide this kind of expertise in the field of fire investigation means that LFB is utilising highly skilled and experienced forensic specialists to add value to their own Fire Investigation Teams, using the latest scientific innovations and methods. In addition, all of services and investigations provided are compliant with regulations, codes of practice and professional guidelines, providing LFB with professional assurance.

▲ Each Bureau Veritas investigation is followed by a detailed report to LFB with recommendations for fire safety improvements.

Qualified Support

Fire investigation accounts for a large proportion of the service that Bureau Veritas provides to the London Fire Brigade. Another important area of support is advising LFB on the handling of hazardous materials. With the use of chemicals increasingly widespread across business and homes, it is important that LFB can call upon qualified scientists who are able to provide expertise and support at chemical, radiation and asbestos-related incidents. These incidents can range from the everyday, such as a chemical leak in a swimming pool, to the more serious and potentially catastrophic which might include, for example, fires containing radioactive materials.

In this field, we are able to provide LFB with on-site and remote support in dealing with hazardous materials and environmental protection. Again, the service we offer LFB enables our specialists to be first on the scene alongside fire crew colleagues, providing end-to-end support

► Bureau Veritas has worked with LFB for more than 40 years, offering round-the-clock support and technical advice.

and helping to detect, identify and monitor any hazardous materials. This may include, for example, using methods such as sampling, spot testing or carrying out detailed chemical analysis with state-of-the-art equipment.

Bureau Veritas also provides London Fire Brigade with expert advice on the safe decontamination of a scene and works with fire service colleagues to develop a remediation strategy. We are also an important link between LFB and third party agencies, such as the Health and Safety Executive or Environment Agency. As is often the case with these incidents, several agencies may also be involved and our experts are able to liaise with their technical counterparts throughout the process to help determine a safe and swift resolution – keeping the time required from senior staff down to a minimum.

The final strand of the service that we offer is in the maintenance of skills of fire



officers. Much of this is scenario-based, where we will identify the latest emerging issues, such as new chemical hazards or the best methods used to manage asbestos and providing LFB colleagues with industry best-practice.

Having worked alongside the London Fire Brigade for more than forty years, we have come to be viewed as an essential resource and an integral part of its service.

By providing the London Fire Brigade with the scientific expertise and resources that it needs to help it understand, mitigate and prevent fire, we know that we are an important part of helping to enhance the professional capability of one of the largest fire services in the world.



For more information, go to www.bureauveritas.co.uk



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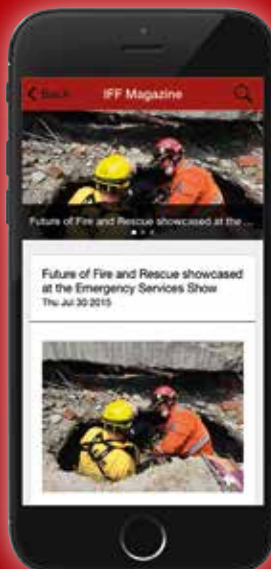
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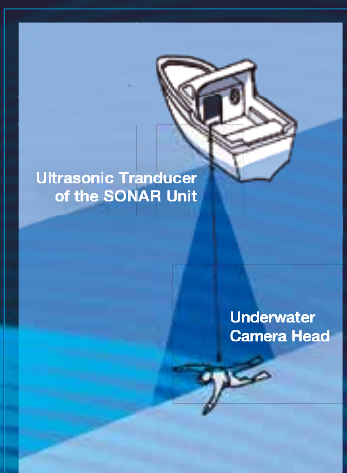
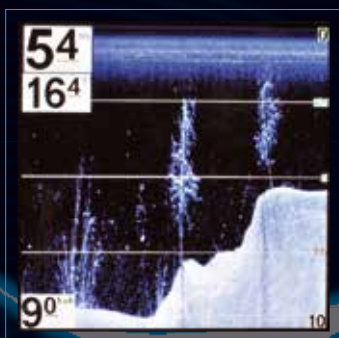
GPS System indicates exact location on the display.



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**SONER Display image**

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Cover image: LEADER fan ready for PPV response integrating the new NEO concept. Image courtesy of LEADER.

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When conditions are at their worst,
we are at our best.

THINKING AHEAD

firefighting series



Firefighter PPE gets personal



Roger Startin

Joint Managing Director,
Bristol Uniforms

Having joined Bristol Uniforms over 30 years ago, I have been closely involved with the many changes that have taken place in firefighting both in the UK and around the world. Back in 1981, modern professional firefighter clothing was emerging following the pioneering work undertaken by Bristol and London Fire Brigade. Drawing heavily on Bristol's early fire garment design, Nomex® fabric was incorporated for the first time in the UK's Home Office A26 specification bunker style fire coat.

Outside the UK, it is worth remembering that a European wide standard for PPE didn't become established until the 1990s. The working party, on which Bristol's technical staff were represented, started work in 1992 and EN469:1995 became the first standard to cover all countries in the European Union. In the USA, the equivalent standard, NFPA 1971, which had been used in specific industries, such as automotive, became the accepted basis for firefighter PPE in the 1970s.

The UK's early involvement in the development of firefighter PPE has had a pronounced impact on the subsequent evolution of international standards and the UK's global presence as a designer and manufacturer of world class firefighter garments. Bristol, an exporter of civilian clothing as early as 1830, now provides PPE to firefighters in over 110 countries around the world, offering garments to meet EN, NFPA and ISO standards. Bristol continues to play an active part in the development of these performance standards covering structural, wildland and technical rescue PPE.

Today, PPE is managed in a holistic way so as to optimise the safety of wearers by concentrating not only on protecting them from external hazards, but also internal health risks linked to physiological responses. These have been addressed by improving the flexibility, breathability and wicking attributes of garments and reducing their overall weight. Garments are now individually sized to firefighters to ensure good fit and comfort. The potential health risks associated with dirty or contaminated garments has also placed the focus on garment cleanliness. The UK has led the world in introducing specialised managed care services for firefighter PPE, providing regular garment inspection, washing and repair as well as specialist decontamination facilities. Bar-coding is used to track and record repairs and maintenance. At Bristol, we manage these facilities in-house to ensure garment integrity and extend service life. Outside the UK, we have encouraged similar facilities to be provided to fire and rescue services through trained and experienced third party suppliers.

In the early 1970s it became clear that success

in opening up, and growing, overseas markets depended upon having permanent local, and well trained, representation able to identify local needs and specifications. Organisations responsible for emergency services vary from region to region and in the scope of their responsibilities. In Europe, as in the UK, countries organise resources on a regional or local basis. In the Gulf States, firefighting is mainly the responsibility of their Civil Defence.

Bristol now has a global network of some 70 appointed distributors who manage and develop our business overseas. A significant part of our business now originates from outside the UK. Our distributors are visited regularly by our international sales managers who provide technical and product training and support their business development activity. Every couple of years all our distributors are invited to our International Distributors Conference held in Bristol. The three day event provides time for training, presentations from key suppliers and a visit to our factory to be fully acquainted with our advanced manufacturing methods and quality control programmes. They also get to know each other better, to share experiences and collaborate.

I believe that our international success can be attributed, in part, to the innovative approach to the ongoing development of specialist fabrics adopted by leading manufacturers such as DuPont, PBI Performance Products, A W Hainsworth and W L Gore. Close collaboration with them helps to energise our own new product development activities. The recent introduction of our innovative XFlex™ design platform for structural PPE, in both EN469 and NFPA1971 formats, provides the basis for our new RescueFlex™ garments. It has also allowed us to bring to market LayerFlex™, an innovative layered approach to meeting the different needs of technical rescue, structural and wildland firefighting using just three garments in different combinations. This offers inventory simplification and potential cost-savings.

In many parts of the world firefighters spend less than 10% of their time responding to fire call-outs. Equipped with better personal protection and equipment, firefighters are now far more effective in handling a much wider range of response situations, including swifter access into burning buildings, which have all helped to reduce still further the number and extent of injuries and fatalities.

As I travel the world, I am constantly reassured by the commitment of fire authorities to continue the drive to improve the safety and security of their citizens whilst, at the same time, raising the level of protection and safety of firefighters through the procurement of higher performance PPE.



Innovation as standard from Interspiro

Interspiro has over 90 years of experience as a groundbreaking innovator of respiratory protection for non-breathable environments. The company develops, manufactures and markets respiratory and auxiliary equipment for fire fighting, work in hazardous environments and professional diving.

Outstanding reputation

Respiratory protection from Interspiro has an outstanding reputation for reliability and performance. This is accomplished with innovative technical solutions and by applying the highest standards of quality to all parts of the value chain. The company's innovation pedigree includes many technology milestones now considered to be standard in the industry.

Interspiro provides management of

through life support and cost, its Total Care contracts take the burden of maintenance away from the user and provides a simple flat fee annual spend to meet the needs of today's emergency services.

Interspiro is a supplier of respiratory protection to the Ministry of Defence, fire and rescue services, police, ambulance, HM Customs, aviation, rescue teams, industries, utilities, shipping and diving companies around the world.



Product portfolio

The company's brand names include: Spiromatic, Spirotronic, QS-system, SpiroGuide, Spiroscape, Spirolite, Divator, Oxydive and IS-Mix.

New For 2015 Incurve and Inspire

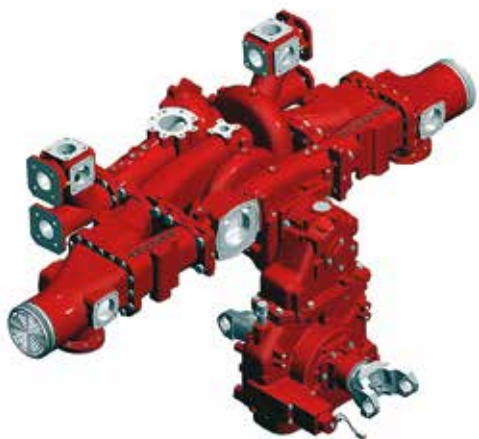
Yet another innovative product from Interspiro is the INCURVE SCBA. With a minimum of textile parts the apparatus is easy to clean, robust and light weight-without compromising comfort. The INSPIRE mask takes all the outstanding features of the S-Mask and adds a quick connection breathing valve.



For more information, go to
www.interspiro.com

Vancouver specs Waterous pumps and CAFSystems for 24 apparatus

Waterous Company, a worldwide leader in fire suppression technology and manufacturing, announced today that Vancouver Fire & Rescue Services in British Columbia, Canada selected Waterous pumps for 24 new apparatus manufactured by Smeal™ Fire Apparatus Co. and sold by Safetek Emergency Vehicles Ltd.



Waterous' CMUC20 two-stage pumps and OneStep® CAFSystems will equip all of the department's new pumpers, rescue-pumpers and heavy-duty aerials.

"We are honored by the Vancouver Fire & Rescue Service's decision to include Waterous pumps and CAFSystems on their new fleet of 24 Smeal™ apparatus," said Steve Toren, director of sales at Waterous. "This decision is testament to the superior performance, longevity and engineering that Waterous pumps offer the fire service and the communities they protect."

The Waterous CMUC20 pumps provide two-stage, high-pressure characteristics that operate at 600 GPM (2,400 L/m) and 600 PSI (40 bar), making the pumps ideally suited for high-rise firefighting. The low profile split-shaft parallel pumps allow pump operators

to switch from pressure to volume smoothly and easily.

"We recognize that there is an opportunity to utilize our fleet in a more cost effective and environmentally friendly manner," said Vancouver Assistant Fire Chief Ken LePard.

The ONE STEP CAFSystem, using less water and less foam concentrate, combines an integrated midship-mounted air compressor system and revolutionary compact foam generator to produce perfect foam with easy, touch-of-a-button operations. The revolutionary system additionally offers pre-set flow rates and pre-set pressures for water and air, so the operator does not have to adjust flows and pressures at the fire scene.

The apparatus are scheduled to begin delivery in January 2016.



For more information, go to
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For more information, go to www.skedco.com

Fire Service Documentary Launches Campaign

A filmmaker from Philadelphia is combining his unique experiences from the fire service with his passion for filmmaking. In an attempt to bring to light what happens “Behind the Bay Doors” in the Fire Service, “Indie” director Brian Sullivan has launched a crowdfunding campaign to fund a feature-length documentary. This 90-minute documentary will focus on the cultural aspects of the brotherhood. This film was inspired by a short film produced in May of 2015 that focused on the frontline efforts of firefighters to protect and serve the public. “Behind the Bay Doors” will be submitted into the film festival circuit in 2017, with an anticipated limited theatrical and Online/VOD release.



To make the film a reality, the production team desperately needs your help. The campaign to fund the film has less than 3 weeks remaining to meet its goal. It can be found online at www.behindthebaydoors.com. Additionally, media inquiries can be directed to Harrison Kendall, one of the Producers leading the film. His email is contact@behindthebaydoors.com and can also be reached at 610-220-6683 (cell).

There is so much more to firefighting than meets the eye. Brave men and women die every year protecting our families – many of which have families of their own. “Behind the Bay Doors” explores some of the lesser-known aspects of firefighting, such as station life, family life, and what it is like to train for disaster situations. This film focuses heavily on the characters at a few select fire stations across the United States.

The director of “Behind the Bay Doors” is a filmmaker who has worked in Hollywood as well as Philadelphia. Brian has a deep-seated passion for the post-production side of the industry, combined with a drive to tell stories that otherwise would go unnoticed. Through this documentary, he hopes to put the fire service in a brighter light throughout the United States.

“Behind the Bay Doors, LLC” is a production company based out of Philadelphia, PA. Our production crew’s experience encompasses both Narrative and Documentary filmmaking. BTBD holds a vast array of talented crew, fluent in areas ranging from pre-production to DI Services, and everything in-between.



For more information, go to
www.behindthebaydoors.com



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New recruits join Shropshire Fire Service

Firefighter recruits from Romania and Slovakia have joined Shropshire Fire and Rescue Service.

Martin Tomanek and Bogdan Ciornei were among the latest intake of 23 on call firefighters who passed out at a Celebration of Success event at Theatre Severn, Shrewsbury, on Monday 9th November.

They include four female firefighters – the highest number to join at the same time to bring the total to 20 across Shropshire.

Group Commander Mark Donnelly said the annual event was held to welcome the new recruits and to recognise their dedication and commitment to serve the people of Shropshire.

They had worked “extremely hard” to pass the entry tests, he said.

He also praised families for their support along with employers whose staff had to leave work at a moment's notice to answer 999 calls across the county.

Martin Tomanek (33) came to Shropshire 13 years ago from Slovakia to work as a volunteer at the outdoor activity Pioneer Centre in Cleobury Mortimer where he is now a maintenance engineer. Speaking no English, he learned the language, went to university and later married his Slovakian girlfriend Tanya and the couple have a 17 month old daughter Lorelei.

He had wanted to become a firefighter since his parents were badly injured in a car crash in Poland five years ago.

“I decided then that I wanted to be a firefighter,” said Martin, who is based at Cleobury Mortimer fire station.

Bogdan Ciornei (31) was a firefighter before leaving for the UK just over two years ago to be with his wife and son. Speaking little English, life had been “very



hard” and he admitted being almost in tears every time he saw a fire engine which reminded him of the life he had left behind.

But he gained a job as a scrap co-ordinator for Denso Manufacturing UK in Telford and joined the Shropshire brigade in June and is based at Tweedale fire station in Telford as an on call firefighter. He won the top student award for his course.

“I was a firefighter and crew manager in Romania for more than eight years. Firefighting is my second love. I hope one day I can be a wholetime firefighter.”

Firefighters and back room staff from Shropshire Fire and Rescue Service have made a number of trips to Romania over the past few years to deliver free fire engines and much needed equipment and help to train Romanian firefighters.

The other recruits are from all walks of life including a music teacher from Minsterley, a Clun barmaid, Market Drayton prison officer, trainee silversmith from Oswestry, a Snowden marathon winner who works as a sales manager

▲ Hats off to the new firefighter recruits at Shropshire Fire and Rescue Service. Chief Fire Officer John Redmond (centre) with Slovakian Martin Tomanek (left) and Romanian Bogdan Ciornei (right) with fellow students.

in Bridgnorth and a former Cluedo champion from Newport.

Shropshire and Wrekin Fire Authority chairman Stuart West thanked employers' Gary Harmer, (employer of Daniel Williams); Tony and Jenny Jones, (Kathryn Frost); and Tim Stone (Martin Tomanek and John Sheffield) for their support.

Special achievement awards went to John Sheffield, Joseph Smallman and Bogdan Ciornei (top students) and Michelle Townsend, James Barrett and Steve Minton (Instructors' Award).

For more information, please contact publicity@elaineadams.com

Las Vegas Firefighters lend a helping hand

On November 7th the combined efforts of Las Vegas Firefighters and the charity Rebuilding Together Southern Nevada culminated in a project to restore a local family home. Throughout the project the Las Vegas Firefighters provided free home repairs and modifications based on the occupants needs to improve the resident's quality of life.



For more information, go to www.rtsnv.org

► The Las Vegas Firefighters and Rebuilding Together Southern Nevada Volunteers.

Voting Begins for the '2015 International Fire Department Team'

▼ 2014 Winners
from Rio, Brazil.

Fire department personnel from nine different countries are entered in the competition to win the international Conrad Dietrich Magirus Award where the winning team will win a trip to visit the Big Apple.

The conditions of their operations are as varied as the nations they come from. This year, the finalists for the international Conrad Dietrich Magirus Award represent Australia, Chile, France, Iran, Austria, the Czech Republic, Turkey, Hungary and from the 2014 title-holder, Brazil. But all eleven teams have provided the same high-level contribution to society with their valuable and essential work. They were selected by a high-calibre jury that has now passed on the choice of the "2015 International Fire Department Team" to the public for the final decision. From the land of the aboriginal people of Australia, to Africa and Europe, all the way to South America, everyone can vote for their favourite team between 10th November and 13th December at www.world-of-firefighters.com.

Magirus launched the prize in Germany in 2012; a year later, the company expanded it to include international teams as well, in order to honour the valuable missions of those around the globe – who are often volunteers – and to give society insights into the everyday work of firefighters. These men and women are on duty 365 days a year, 24 hours a day to rescue others, sometimes at the cost of their own lives. By voting, everyone around the world can express their appreciation for their invaluable commitment.

The fire department team with the most votes will travel to the headquarters of Magirus in Ulm for the awards ceremony on 22th January 2016. The winning team will then be announced live. Not only can the winning team take home the coveted Conrad Dietrich Magirus statue, the "Oscar of the Firefighting Sector", but also look forward to a unique journey to New York – flight and accommodation included. In the Big Apple, they will do more than just take a look over the shoulder of their comrades in the New York City Fire Department (FDNY). In addition to tours of various fire stations and to the Training Academy "The Rock", they will also visit the most modern fireboats in the world. This is a trip that could lead to completely new dimensions even for very experienced firefighters.





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Securex 2016 moves to new venue

Securex West Africa takes place from 1st–3rd March 2016 and is the largest commercial, homeland, cyber security, fire protection and safety exhibition held in West Africa. Now entering its sixth year, it has continued to grow and improve to suit the dynamic market place in which it sits.



As the security market in West Africa is evolving, so are the priorities of those within it. Fire safety is a large growth market as more commercial premises are being built to accommodate the needs of the burgeoning economy and the specifications required by global multinationals ensure that safety is put at the forefront of the planning procedure. Fire and rescue services are also in need of a large overhaul with training and equipment levels well below the standard required.

Before the end of the year, President Muhammadu Buhari of Nigeria will finally have his Ministerial nominees allocated to their portfolios, which means the powerhouse of West Africa will hopefully get back on track with its economic charge. This will lead to the tenders for oil, construction and mining to be snapped up, all of which take a considerable amount



of management and should be of great interest to security and safety focused companies.

For 2016, Securex West Africa is moving to a new purpose built venue, The Landmark Centre, Lagos. It is also increasing to run over three days and will be supported by a high powered conference program made up of presentations and discussion panels with the industries leading minds.

 For more information, go to www.securexwestafrica.com

Sides Sentinel for the Ivory Coast

ASECNA – The Agency for Aerial Navigation Safety in Africa and Madagascar have taken delivery of this stunning state-of-the-art Sides “Sentinel” 6x6 airport crash tender.

The Sides Sentinel is built on a low-profile purpose built M.A.N 6x6 ARFF vehicle chassis combined with a 500kw M.A.N D2868 Euro 5 common rail diesel engine linked to Twin Disc automatic transmission. It features a user-friendly Ergo design crew safety cab fully complying to European 2012 R29 standards boasting low vibrations, an unrestricted non slip flat floor layout, forward opening bus style doors, air conditioning and seating for a driver and five crew.

The top hamper bodywork is of modular construction boasting 4000 litres of useable stowage space with the lockers enclosed by a combination of roller shutters and pantograph doors. The Sentinel features the SCONTROL fire-fighting control and management system for Sides airport fire-fighting vehicles. Its touch screen provides access to all commands and controls

for the hydraulic systems; the response equipment and lighting; in-addition to a dedicated screen that displays details of the maintenance operations and any faults.

This specific variant carries 12,000 litres of water, 1,650 litres of foam plus 250 kg DCP. Fire-engineering includes a 7,200 lpm Sides centrifugal pump, a 6,000 lpm roof mounted monitor and a

950 lpm bumper turret – both joy-stick controlled. This Sentinel is destined for Abidjan Felix Houphouët-Boigny International Airport serving the city of Abidjan on the Ivory Coast. The Sides Sentinel range exceeds all current ICAO and NFPA standards.

 For more information, go to www.sides.fr



Image courtesy of Laurent Russo – Sides

National Fallen Firefighters Foundation

Serving the Survivors of the Fallen and the Entire Firefighting Community

The United States Congress created the National Fallen Firefighters Foundation (NFFF) to lead a nationwide effort to honor the memories of all U.S. firefighters who died in the line-of-duty and to provide support to their loved ones. As part of this mission, each October the Foundation hosts the National Fallen Firefighters Memorial Weekend, the official national tribute, in Emmitsburg, Maryland. The survivors of those being honored meet others who have walked this path a little longer and understand their grief in a way many may not. Through activities offered during the weekend they will find reassurance that their loved ones will not be forgotten and they have a place to find comfort.

Beyond the Memorial Weekend, the NFFF helps families with similar experiences and interests find each other through the Survivors Network. They provide college scholarships for spouses, partners and children and step children. They coordinate conferences where survivors can participate in workshops for family members and coworkers.

Recognizing that children need and deserve special attention, the NFFF introduced the Hal Bruno Camp for Children of Fallen Firefighters in partnership with Comfort Zone Camp. This free, weekend bereavement camp for children between the ages of 7 and 17 allows them to share their stories, learn skills to manage their loss and have time to reflect and remember their parent in a positive, fun and nurturing environment. The camp was named to honor the late Hal Bruno, Chairman Emeritus of the NFFF Board of Directors.

In addition to helping the families, the NFFF has resources to assist fire department leadership in managing this tragedy. The Local Assistance State Team (LAST) program is a collaborative effort

between the NFFF and the Department of Justice to ensure that survivors of firefighters who died in the line-of-duty receive Public Safety Officer's Benefits.

Over the years, the NFFF has realized that the best way to honor the fallen and support their families is to work with all branches of the fire service to reduce line-of-duty deaths and injuries.

In 2004, the first Firefighter Life Safety Summit was held in Tampa, Florida to address a need to reduce the number of preventable line-of-duty deaths. More than 200 fire service and industry leaders worked together to develop the 16 Firefighter Life Safety Initiatives (FLSI). In 2014, the NFFF convened TAMPA2 to assess, refine and ratify the 16 FLSIs. Important questions were raised and new approaches for the fire service suggested.

Out of those initiatives, the NFFF created Everyone Goes Home®. This program provides free resources, materials and training opportunities to our nation's firefighters that underscore accepting responsibility for our health and safety. Through programs like Everyone Goes Home®, Courage to be Safe®, or Leadership, Accountability, Culture and Knowledge (LACK) training for department officers, firefighters learn valuable skills that

will make the fire service a safer place.

The Foundation also advocates for improved safety standards and equipment, not only within the fire service but in our communities. Many jurisdictions throughout the country are considering requirements for sprinklers in new home construction. The NFFF is working diligently to educate law makers on the critical importance of these measures for the safety of their citizens, including the firefighters who serve them.

In addition, the Foundation regularly sponsors meetings and summits to address evolving needs of the fire service community such as cancer prevention and behavioral health issues. They also have provided funding for research that examines coronary heart disease, stroke and diabetes prevention.

Unfortunately, there will always be incidents that are beyond our control and firefighters will die even when they have done everything right. With this in mind, the NFFF will continue to work tirelessly to support the loved ones and provide training and education to help reduce the number of losses.



For more information, go to
www.firehero.org



Image courtesy of National Fallen Firefighters Foundation

► Firefighters from across the country help the NFFF honor and remember America's fallen firefighters.

Bronto Skylift

Rooted in the sky

► Bronto Skylift F112HLA – with its rescue height of 112 meters – is the highest truck-mounted aerial platform in the world.



Images courtesy of Bronto Skylift

Bronto Skylift – the global market leader in truck mounted hydraulic platforms – designs, manufactures, sells and services appliances for rescue and firefighting as well as for construction work.

Product range includes approximately 50 models with working height from 17 to 112 meters. The advanced modularity also allows numerous client-specific modifications. During the past 50 years Bronto delivered over 6,700 units to fire brigades and industrial customers throughout all continents in more than 120 countries. Headquarters and production is situated in Finland and subsidiaries are in Germany, Sweden, Switzerland and USA. The company has been part of Federal Signal Corporation since 1995.

Bronto Skylift has been an integral part of developing the life and property saving machinery worldwide. Fire and rescue operations are a part of the real daily life, where people need to be saved from tricky and dangerous circumstances at extreme heights. We all respect the sweat and courage it takes to save lives, so let's take a moment to salute the rugged machines that work with the heroes to make this possible.

▼ **Newest Bronto Skylift unit, F60XR, is the highest truck-mounted aerial platform with ladders providing an outreach upto 31.5 meters.**



Back in history

Fire and rescue operations began to utilize the aerial ladders and over time these ladders grew bigger due to ever increasing need for reaching greater heights and taller buildings in the early 20th century.

Initially, fire fighters would throw a water hose over their shoulder, scale a ladder in full gear and use the same route for bringing people down to safety. This was not the safest or most efficient method for the growing needs.

Improvements occurred in technology and by the 1950s elevating or aerial platforms came into use. These provided benefits such as greater maneuverability, but still something important was missing.

There must be better

Bronto Skylift came to the rescue with a real and exiting solution and offered a 2-in-1 solution with a groundbreaking telescopic hydraulic platform with ladder, making its first appearance in 1984, in Birmingham, UK.

By combining a turntable ladder with a hydraulic platform, fire applications got the best of two worlds. This maintained the stability of a boom, the rescue capacity of a cage, with waterline and the mass evacuation capabilities of a ladder. Safety and efficiency for both, the rescuers and the rescued was improved exponentially by this innovation.

And what about the future?

The need for aerial rescue vehicles will remain with a call for greater compactness for negotiating traffic and city or landscapes. Clever and more versatile machines are also on the horizon, to best meet growing demands for applications such as: fire-fighting, water rescue, chemical fires, silo maneuvering and surveillance activities.

In the future, Bronto Skylift will continue with "its unique world offering, which includes an entire range, from the biggest to the smallest" devices to serve every customer need.

Few milestones...

- **1961** – All own manufacturing. First 2-boom aerial platform to domestic customer.
- **1966** – First 3-boom rescue and firefighting platform to Sweden.
- **1978** – Bronto Skylift's hometown, Tampere, Finland, gets first rescue and firefighting platform.
- **1984** – Telescopic hydraulic platform with ladder, first appearance in Birmingham, UK.
- **1994** – Highest platform in the world at 72 meters to Brazil.
- **1997** – The 4,000th unit is built and supplied.
- **2005** – Introduction of the first 90-meter rescue platform, F 90 HLA, at Interschutz. The unit is the 5000th Bronto unit built. A new range, RLX, rescue ladders with telescopic cage boom also launched.
- **2009** – The world's highest truck mounted platform, Bronto Skylift F 104 HLA reaches up to 104 m.
- **2010** – Bronto Skylift breaks its own record with the 112-meter unit, F 112 HLA
- **2015** – New F-XR range and Skyliftfleet.com service offering released



For more information, go to
www.brontoskylift.com



YOUR PARTNER IN THE SKY

When saving lives and properties at extreme heights, you must be able to focus fully on your mission. In the heat of the moment, the dependability of your equipment and partners matters above all.

Bronto Skylift has the experience and expertise to be right beside you at any altitude. As our partner, your safety and efficiency are backed by a leading global manufacturer of aerial platforms and rugged equipment. Your performance can rest upon the latest and most reliable solutions to get you where you need to be.



Marcé Fire Fighting Technology

Supplies vehicles for the new St Helena Airport

St Helena is situated in the middle of the South Atlantic Ocean and forms part of the British Overseas Territory along with Ascension Island and Tristan da Cunha. The island is more than 1200 miles from the nearest major landmass in West Africa; and currently it can only be reached by a ship from Cape Town once every three weeks. This small island with its resident population of 4500 is factually one of most remote but populated places on earth!

Considerations for an airport on St Helena were first proposed in 1943 when the South African Air Force undertook a survey on Prosperous Bay Plain from October 1943 through to January 1944. They concluded that it was feasible but an airport at that time was not a practical proposition. From the 1960's the idea of building an airport was always

proposed but it was not until 1999 that it was seriously taken up by the island government. After many years of canvassing and consultation, in 2005 the British Government finally announced plans to finance and build an airport on St Helena. However following further delays and the credit-crunch it was not until November 2011 that a company was finally appointed and given the go ahead to build the airport.

Engineering Group Basil Read (Pty) commenced the construction of the airport early in 2012. The logistics associated with the airports construction were critical because of the island's isolated location, the lack of construction equipment on the island and the fact that all the heavy duty equipment and the materials had to be shipped in. This has resulted in a mammoth and unique construction project!

Brand new airports are pretty rare these days. But this new 260 million pounds Sterling airport is particularly significant as it is the only airport for nearly 1000 miles in any direction!

St Helena Airport isn't quite ready to

open just yet but the first calibration trials using a Beechcraft King Air aircraft took place in September 2015 with the airport on target to open to commercial and private aircraft early in 2016.

St Helena Airport will boast a 6,070 foot runway, a terminal building, fuel storage facilities and a dedicated fire and rescue service. This mirrors the set up you would expect to find at a small regional airport in the United Kingdom. The first scheduled flights will initially link St Helena with O R Tambo International Airport in Johannesburg.

The inaugural fire-fighting vehicles

Marcé Fire-Fighting Technology was formed in 1998 with its spacious head-office and main manufacturing plant based in Centurion near Pretoria in South Africa. The company started as an importer of fire-fighting vehicles and equipment but in 2001 the Marcé management realised that there was great potential in local manufacturing providing that high standards were met. Today the company builds between 75-80 high quality and innovatively designed fire-fighting and rescue vehicles per annum – employing 150 people at their Centurion site.

Following the competitive tendering process, Marcé was appointed to supply the new St Helena Airport with its inaugural fleet of airport rescue and fire-fighting vehicles. These fire-engines were tailored to meet the customer's specific requirements and manufactured within the precise timings of the airport project – taking in to consideration the proposed opening date and the logistics associated with delivering the fire engines to this remote island. Marcé has built and delivered three “Marcé Buffalo” airport fire-fighting vehicles based on the proven Mercedes Benz Actros range of all-wheel drive commercial chassis.

Fire 1 and 2 are identical “Buffalo” major airport foam tenders built on a Mercedes Benz Actros 3358 6x6

▼ 1 of 2 identical Marcé Buffalo major airport foam tenders supplied to the new St Helena Airport – based on Mercedes Actros 3358 6x6 chassis.



Image courtesy of Donovan Kruger – Marcé Fire Fighting Technology

Images courtesy of Donovan Kruger – Marcé Fire Fighting Technology



▲ A side view of Fire 2 showing the clean lines of the Marcé crew cab extension, the St Helena Airport corporate livery and the battenburg markings.

► Fire 3 is a Mercedes Actros 1858 4x4 Marcé Buffalo airport foam tender. This foam tender was delivered unmarked in August 2015 prior to the airport's corporate livery being officially approved. The corporate livery and battenburg reflective markings have now been applied locally.



ST HELENA
AIRPORT



chassis featuring a 580 hp Euro 3 diesel engine and automatic transmission. These foam tenders feature a spacious clean flowing Marcé extended crew-cab conversion seating a driver + 5 crew incorporating wide opening doors, easy crew access and rear mounted SCBA mountings plus additional air conditioning. The rear superstructure is of modular construction incorporating five large lockers enclosed by roller shutter doors. These major foam tenders carry 8000 litres of water, 600 litres of foam plus 135 kg of DCP courtesy of Perren Engineering Limited. The fire-engineering consists of a 4000 lpm Zeigler centrifugal pump linked to a 3000 lpm bumper turret and a 4000 lpm roof mounted monitor – both joy stick controlled.

Fire 3 is a “Buffalo” airport foam tender based on a Mercedes Benz 1858 4x4

chassis featuring a 580 hp Euro 3 diesel engine and automatic transmission. The Mercedes Benz cab seats a driver + 1 crew and is fitted with a front mounted electric winch and bull bars. The superstructure also features a five locker arrangement and media of 5000 litres of water, 440 litres of foam plus 135 kg DCP. It has the same fire-engineering as Fire 1 and 2.

The three fire tenders were manufactured to a very high standard and meet all current ICAO and NFPA standards. The tenders boast generous locker space, two stacks of water and foam media level warning lights and an interesting combination of conventional blue – mixed with the latest clear light technology warning lights. The fire engines were delivered fully equipped and stowed in two shipments in August and September 2015.

Jan Steyn Commercial Manager at Marcé Fire Fighting Technology told the International Fire Fighter Magazine that the company was pleased to be associated with the new St Helena Airport and honoured to have been selected to supply it with its inaugural fleet of fire and rescue vehicles. Working closely with the customer we have built and delivered three robust airport rescue and fire-fighting vehicles well within the critical timings of this project.

When fully operational St Helena Airport Fire service will provide professional fire and rescue cover to ICAO category 7 standards – under the leadership of Fire Service Manager Marc Fowler.



For more information, go to
www.marce.co.za

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www.ferrarafire.com/industrial

FERRARA

Not All Pumps Are Created Equal

Not all pumps referred to as a fire pumps are the same. Choosing the correct pump for the specific job is complicated, because the name fire pump is used to describe a wide range of different styles and designs of pumps; all of which are used for different applications that are regulated by different standards.



Gary Handwerk

Gary has been in Fire Equipment Industry for over 44 years, and has worked for various fire apparatus or fire pump manufacturers, holding positions in engineering and product management, and is currently President of US Fire Pump. He has had the opportunity to visit over 247 different fire apparatus factories and to be a speaker or an instructor at events around the world. Additionally Gary is active in NFPA 1901, 1911, 1912 and 1925 for more than 25 years, and was a member of the NFPA Fire Apparatus Committee for 20 years.

There are fire pumps in boats and ships; buildings and plants; in fire apparatus' of many different types; and in portable self contained packages, such as skids, trailers and PODs. All of these applications require a different pump design and must meet different regulations and standards.

Marine vessel applications can basically be divided into internal fire protection and external fire fighting systems. The internal systems are for self-protection and include: small portable fire pumps, ultra-high pressure fixed systems and normal pressure fire hose stations located at various places on the vessel. Most of these systems have a fixed performance and can be automatically or, in some cases, manually activated. These internal built in systems are highly regulated and covered by a variety of specific standards from

the following organizations: NFPA, ABC, ABYC, EN, ISO among others. This is a very specialized market segment.

External firefighting systems can be used for attacking fires onshore, on drilling rigs and on other vessels. They can be as basic as a portable pump mounted on a small boat. However, they are more commonly built in systems designed to meet NFPA1925 (Standard on Marine Fire-Fighting Vessels), or equivalent standard, or perform to the FiFi requirements and have the pump type tested by ABC, or equivalent organization.

NFPA is a North American standard used for municipal fire boats. NFPA1925 has pump ratings of 500 US GPM (2000 LPM), 1500 US GPM (6000 LPM), 4500 US GPM (17,000 LPM), 10,000 US GPM (38,000 LPM) and 20,000 US GPM (76,000 LPM). FiFi is an international performance standard most commonly used for vessels protecting drilling rigs and dry dock facilities. FiFi performances are as follows: FiFi 1/2 is 5230 US GPM (1200 m³/h), FiFi1

▼ **A US Fire Pump 5,500 GPM Mobile Trailer Unit supporting an industrial pumper.**



Image courtesy of US Fire Pump



Images courtesy of US Fire Pump

is 10,560 US GPM (2400 m³/h), FiFi2 is 31,680 US GPM (7200 m³/h) and FiFi3 is 42,240 US GPM (9600 m³/h).

These pumps do not normally draft water and most of the larger pumps do not operate smoothly at low flows, such as during a hand line operation, without dumping large quantities of water off the back of the vessel. Many of these pumps are based on standard industrial process pump designs. To get the desired maximum flow, some fire boats have been built with multiple fire apparatus derived pumps in order to obtain the overall performance flexibility to operate at low flows or at higher pressures than those available from a single big process type pump.

Building and plant fire systems are fixed systems designed to feed standpipes, connections for hand lines, or to feed fire apparatus or fire trailer packages, sprinklers or fixed monitors. By design the fire pumps utilized in these systems operate at a fixed flow and pressure. When the system is activated, whether automatically or manually, the driving source, either an electric motor or a diesel engine, starts and ramps up to a fixed speed. Flow and pressure is controlled at the individual line

outlets by automatic valves. Commonly these systems do not draft water, if the water source is static a submersible pump, called a vertical turbine pump, is used to lift the water to the system, and in most cases, is then boosted to operating pressure by the fire pump.

These pumps are commonly covered by NFPA20 (Standard for the Installation of Stationary Pumps for Fire Protection) and are listed by ULI and approved by FM. Most of these pumps are based on standard industrial process pump designs. The traditional industrial process pumps are designed specifically to operate with a fixed flow and pressure entering the pump intake. They then add the power from the drive source at 1800 RPMs to produce a fixed flow at a higher pressure coming out of the discharge.

Yes, they will work to some degree under other conditions but at a narrow window of performance and still operate smoothly. Lift in particular is a problem for these process pumps, because in a normal industrial plant setting there are no drafting operations.

Apparatus fire pumps by design are different than the above mentioned fire pumps because they must operate at rated

▲ The Ferrara Inundator Super Pumper can reach 10,000+ GPM from a pressurized source.

performances from a specific drafting condition, and offer some performance at drafting lifts as high as 25ft (7.5M). Additionally they must be able to pump from a pressurized water source as high as 200psi (13.7Bar). Whether drafting or operating from a pressurized source these pumps must be able to flow from 0 to 100%, or more, of the pump rated capacity at a range of pressures from 60psi (4Bar) to over 300psi (20Bar).

From a sufficient pressurized source it is expected to perform at up to 150% of the rated capacity. When rolling up to a fire, the performance required and the water supply can vary considerably. However, the fire still needs to be controlled and at a smooth and even output. This wide range of performance under a wide variety of suction conditions is required to give the fireman the flexibility needed to cover all the emergency conditions they could encounter.

Additionally, fire pumps designed to be used on a fire apparatus must have the capability of being mounted and driven by

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Image courtesy of US Fire Pump

▲ **The US Fire Pump 6,000 GPM Enclosed Skid Unit (POD) with Williams Ambassador deck gun.**

a chassis engine driven power take off. All of this requires a special pump designed for the application.

Fire Apparatus pumps are covered by the following standards: NFPA1901 (Standard for Automotive Fire Apparatus), NFPA1906 (Standard for Wildland Fire Apparatus) and NFPA414 (Standard for Aircraft Rescue and Fire-Fighting Vehicles) in the NA driven markets or EN 1028 (Standard for Fire-Fighting Pumps) for European driven markets.

A pump designed for mobile firefighting applications will also have a variety of available options and features to make the installation and applications work more effectively. They include: an all bronze pump end option for operating in sea water conditions, a variety of gear ratio options to tailor the pump performance to a variety of engine mounting points to accommodate vehicle installations; suction intake and discharge outlets to accommodate fire apparatus plumbing and valves; rotatable gearbox and volute to accommodate vehicle installations; pump end designed

to withstand a 500psi hydrostatic test to provide resistance to water hammers; and most importantly a volute and impeller designed to provide the performance flexibly needed for the firefighter under a wide range of conditions.

Portable pumps are self-contained packages ranging from small gasoline driven pumps with a 5.5HP engine to a 750HP diesel powered skid package. These packages can be used for water supply or even dewatering; however, fire pumps should be designed to duplicate the performance of a fire apparatus. Smaller portable fire pumps are primarily used for fighting fires in inaccessible areas where a fire apparatus cannot respond.

These portables are normally designed to be carried by four or less personnel and are limited due to weight to about 100HP or less for a gasoline engine or about 35HP for a diesel engine. Larger portable pumps are designed as a lift able skid or POD, but are commonly mounted on a trailer. These packages are often used at port facilities, oil refineries, industrial plants, or by military facilities. Performance can be as high as 6250 US GPM (23,500LPM) and still meet the requirements of NFPA1901 that apply to this type of package. If it is expected to

operate in place of a fire apparatus then it should perform like a fire apparatus with all of its relative features and full range performance flexibility. If operating as an apparatus then it should perform to the same standards where applicable.

The overall theme of this article is to buy a pump based on its application and apply the appropriate standards for that application. NFPA20 pumps do not go on any mobile or vehicle applications.

Marine vessel applications are highly regulated; municipal fire boats should look very closely at the NFPA1925 standard while considering also meeting Fifi performance standards. Commercial vessels should follow the applicable internal fixed systems regulations

If you are building a fixed fire system in a building to feed sprinklers, hydrants or standpipes buy a process type of pump designed to meet NFPA20 or equal standard. If you are building a fire apparatus, a trailer or POD firefighting package buy a fire pump designed for the duty to the NFPA1901, NFPA1906, NFPA414, EN1028 or equal standard.



**For more information, go to
www.usfirepump.com**

1



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2



THE ORIGINAL FLOATING STRAINER WITH RISER

Use with riser attached as either a floating strainer or a low-level strainer.

3



THE FLOATING WATER EDUCTOR

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4



THE WATER EDUCTOR

The Water Eductor can be used with or without float in rivers, creeks, ponds or swimming pools.

Fighting Ship Fires for the Army?

The Kwajalein Atoll is part of the Marshall Islands and is half-way between Hawaii and Japan in the Pacific Ocean. It is also home of the Ronald Reagan Ballistic Missile Defense Test Site at the U.S. Army Kwajalein Atoll, commonly referred to as the Reagan Test Site. So why would Marine Firefighting Inc. and I be brought all the way out here for a US Army installation?



Tom Guldner

Tom is a retired Lieutenant of the New York City Fire Department's Marine Division and is a Principal Member of the NFPA Technical Committee on Merchant Vessels. His company Marine Firefighting Inc. is involved in consulting and training mariners and land based firefighters in all aspects of marine fire fighting.

Kwajalein Island is the southern most and largest island in the necklace of islands known as the Kwalalein Atoll which is part of the Republic of the Marshall Islands.

Being an island and also being a major research site, all of the needed supplies must be brought in by ship. Food, fuel, research equipment, and just about anything needed on the island arrives by ship.

Chief John Finley heads up the US Army Kwajalein Atoll Fire and Emergency Services training division. He realized that, although his Firefighters were well trained in regards to structural firefighting, they were lacking in their knowledge of ships and shipboard firefighting. With the only major port located within his area of responsibility he realized that this was a major problem.

▼ The author aboard the tug boat Mystic.

The operation on Kwajalein is professionally managed for the US Army by Chugach Management Services, Inc. who actually contracted for the services of Marine Firefighting Inc. We were to provide training and testing in all areas of shipboard firefighting.

When I first arrived, Chief Finley gave me a tour of the island and especially the port facilities. I found a well run community consisting of a restaurant, a movie theater, recreational facilities, as well as the many scientific and administrative buildings one would expect. However, my first and most alarming observation came when I looked into the water from the bulkhead of the small boat marina. There were over a dozen sharks, most over 8-feet in length circling the area. Being the brave, experienced, scuba-diver that I am, my first reaction was, "I'm not getting into THAT water"! It turned out that these were brown sharks which do not usually pose a real threat. To my mind though, anything



Image courtesy of www.marinefirefighting.com



Image courtesy of www.marinefirefighting.com

with the last name of shark is not in my book of swimming buddies.

The main pier was set up in a “U” shape with each side of the pier designated into sections and marked alphabetically. A container ship arrived periodically at the “F” or Foxtrot pier. Many service vessels and ferries used the other piers when in port. There were several landing craft vessels (reminiscent of John Wayne World War 2 movies) which were used to ferry goods, equipment, and the local Marshallese citizens who worked on Kwajalein but commuted back and forth the nearby island of Ebeye where they lived.

On the other side of the port there ran a long narrow pier that services the fuel dock. Tankers would offload the fuels needed on the island which would then be piped to the many storage tanks located inland.

My first questions dealt with water supplies. While there were adequate fire mains and hydrants throughout the island, none ran out onto the piers. There would be no problem for a vessel located along the landside bulkhead or even for a vessel located on a pier but close to the land. For any vessel located further out on the pier alternative water sources would be needed.

Chief John Finley had his Firefighters trained to use drafting as a primary water

source for any vessel at dock a substantial distance from the land and the land based hydrants would be back-up, if possible. This seemed reasonable seeing that many land based fire departments throughout the USA are dependant on drafting. But I always like additional sources of water supply so I kept looking.

I had one full day on Sunday to try to get over my jet lag from my 16-hour flight and also crossing the International Date Line so I used it to scout out additional sources of firefighting water

As it turned out I didn't have to look far. One of those landing craft vessels I mentioned before is customarily docked directly across the pier from where the container ship usually off-loads. I noticed two small fire monitors mounted on the roof of the vessel bridge so I thought that there should be a fairly substantial fire pump aboard also. As it turned out there was. The vessels name was the “Great Bridge” and it had a wealth of firefighting resources on board.

In addition to a 1,200 GPM fire pump the vessel also carried:

- 200 gallons of foam concentrate
- 2 fire monitors mounted above pilot house

▲ In 36° C (97° F) temperatures
Firefighters prepare to board.

- 2 gasoline powered portable de-watering pumps
Note: May also be used for firefighting.
- 1 Hi-capacity electric de-watering pump
- 2 Portable smoke ejector fans
- 3 Extensions for Navy Fog nozzles

On Monday morning (which was Sunday evening stateside in the USA) we started the classroom portion of this training program. Over the next five days we covered all aspects of fighting a fire on a vessel in port.

On Thursday we played a game of “Shipboard Firefighting Jeopardy” followed by an exam to see if everyone understood the classroom instructions. Everyone passed with flying colors so we discussed the fire scenarios we would conduct the following day. We originally hoped to be able to use the container ship that visited the Island but it would not arrive until the following week. We next hoped to use the vessel, “Great Bridge” on which I had previously found all the firefighting recourses listed above. That did not work either as the “Great Bridge” would be leaving on the day before our drill for research duties.



▲ Tug boat Mystic, where the drill took place.

▼ Firefighters are warned about the many confined spaces aboard.



The vessel we finally settled on was a Navy tug boat "Mystic". In the marine environment you have to expect changes to ship availability. We made the best of it and as it turned out, the Mystic was a beautiful old girl.

Built in Louisiana in 1981 and originally civilian owned, the Mystic has been in-service for the Army in Kwajalein since 1987. At 120ft and 193 tons it provides towing, and vessel docking at this facility. It would now serve as our fire and rescue simulation vessel.

Before the students were set loose on an actual scenario we did a vessel walk-through to point out some of the dangers aboard.

In the photo on the right the students were shown some of the many confined spaces found aboard the Mystic.

Confined spaces are common aboard commercial and military vessels of all sizes. The students were instructed that only confined space trained firefighters should enter these areas. In addition to the dangers associated with a confined space many of these areas aboard vessels also had hazardous atmospheres. They were either toxic or lacked sufficient oxygen to support life.

Other hatches might lead to a secondary access to areas below deck.

Knowing the layout of vessels which frequent your area can help make a harrowing attack on a below deck fire a bit easier or allow an injured victim to be brought topside much easier.

Seek out knowledgeable members of the vessels crew to seek advice about finding your way to an area aboard and more importantly finding your way out when things go wrong.

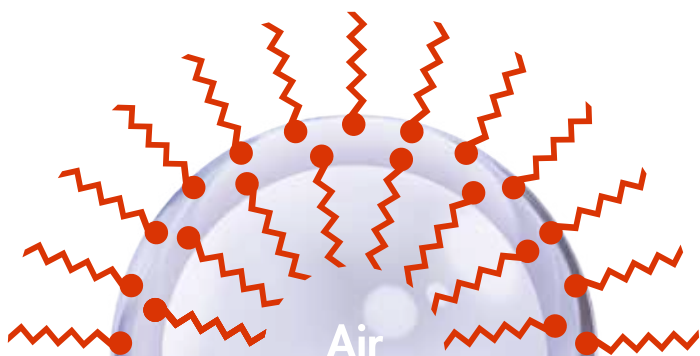
For the scenario we had a fire in the engine room. When members arrived they were informed that one crew member did not report to his "muster station" after the fire alarm sounded and that he was listed as missing.

The apparatus was positioned to draft water at the edge of the pier and hose lines were stretched.

Students suited up in full personal protective gear and prepared to board the vessel. Remember, this is an Island in the middle of the Pacific Ocean. The temperature was about 98° F and the humidity was about equal to the temperature. These Firefighters were

Image courtesy of www.marinefirefighting.com

Fatal Attraction



Fluorine-free foam bubble

F3 Foam **attracts** hydrocarbon fuels

 **Hydrocarbon surfactant**
(Hydrocarbon tails are fuel-loving)

FORCEFUL F3 APPLICATION:

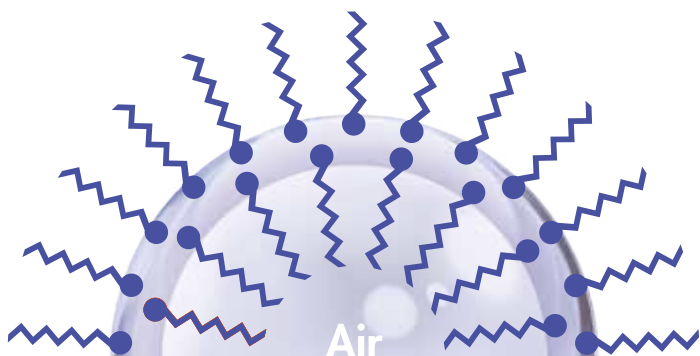
- Foam attracts fuel
- Foam becomes flammable
- Foam has reduced performance
- Foam use is increased

Need proof? See F3 foams on fire:



FORCEFUL AFFF APPLICATION:

- Foam repels fuel
- Foam is NOT flammable
- Foam has superior performance
- Foam use is reduced



Fluorinated foam bubble

AFFF Foam **repels** hydrocarbon fuels

 **Fluorosurfactant**
(Fluorocarbon tails are fuel-hating)

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▲ Missing engineer found after search of cabins – note facepieces covered.

◀ Firefighters prepare hoses for boundary cooling during CO₂ operation.

going to get hot and exhausted very quickly. And this time there was NO FIRE. Hydration and cooling stations must be set up immediately.

The officers conferred with the vessels captain and found that the fire was located in the engine room and that the missing crew member was on the engineering staff. Further questioning determined that the missing engineer was not on-duty at the time of the alarm so it was decided to search his cabin and then the galley.

After consulting the vessels fire plan the safest and quickest route to the missing crewmembers cabin was found. Members of the search team AND the F.A.S.T. team were both shown this route on the fire plan at the same time and were also informed of alternate means of egress should the initial entry route become un-usable. It is important that both teams receive the same instructions at the same time. In this way the F.A.S.T. team is already aware of the route taken by the search team and will be ready to start their rescue immediately.

The search team did not go “on-air” until they were about to enter smoke. Their air tanks, while rated at 30 minutes only provide about 20 minutes of air in a stressful environment. You don’t get a more stressful environment than this.

And remember that 20-minutes must not only get you into the area it must also get you out!

As the search team descended to the level of the crews cabins they felt for doors on the side of the hall. They had been instructed to count the number of doors so they would know when they reached the missing crew members cabin. The number of doors to pass was learned while looking at the fire plan.

The search crew found the missing crewmember on the floor of his cabin unconscious. He would have to be dragged out to an area where he could be put on a stretcher. The rescuers also found out that it is no easy task to drag and carry an unconscious adult in a confined area and still remain low.

While the search was going on other firefighters stretched hose lines on deck to an area where they could access the fire in the engine room.

In the first scenario it was decided to use the CO₂ system to control the fire. The Firefighters were told that they should then use their hoses to perform “boundary cooling” while the CO₂ was working. In the second scenario the firefighters were told that the CO₂ had been discharged prior to our arrival and that some of the vents to the engine room had not been closed. Because of the

open vents all the CO₂ was vented to the atmosphere and the engine room fire was still raging. They then instituted a foam attack through the grates in the floor of the room in the rear of the deck house which lead directly to the engine room. In the classroom the students were told that most engine room fires were oil fires and that the oil was usually burning in the bilge or lowest area of the engine room. This is a common area where oil would accumulate. Luckily our firefighting foam would also find its way into that same bilge area. If this method didn’t work then the Firefighters might have to attack the engine room fire directly which is not fun.

Well, as with most scenarios, our fire did go out and the missing crew member was found, rescued, resuscitated and is now back in the US Army Kwajalein Atoll Fire and Emergency Services training locker. All our Firefighting students were given a well earned rest and cooling off period and we left the post drill critique for the comfort of the air conditioned classroom.

I want to thank Chief John Finley and all the officers and members of the US Army Kwajalein Atoll Fire and Emergency Services. Their dedication and desire to learn made my job that much easier.



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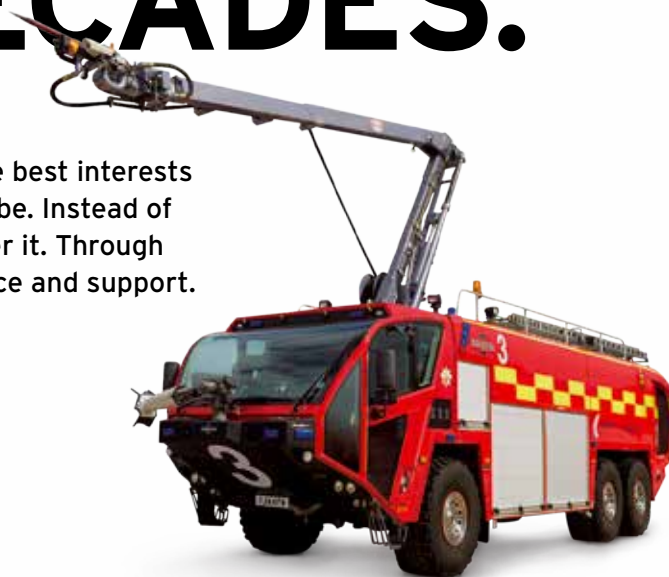
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Manchester Airport, UK

Maintaining the Highest Safety Standards



Manchester Airport is one of four airports within the Manchester Airport group (MAG)

The airport is located at the hub of the new Northern Powerhouse, ideally located for national road and rail networks. It is a category 10 airport serving over 23 million passengers who can travel to and from many global destinations.

The airport is served by two strategically located fire stations covering its two runways, three terminals and many different risks. The Rescue and Firefighting Service provides 24/7 emergency cover for aircraft and airfield incidents, domestic and special service calls and more recently medical calls including co-responding in partnership with North West Ambulance Service.

Staffing of the Rescue and Firefighting Service comprises of 88 personnel providing a minimum staffing of 16 on duty across a 4 watch system. These personnel provide the response model for the largest category of aircraft that uses that airport (CAT10)

In 2014, Manchester Airport carried out a comprehensive review of its Rescue and Firefighting Operating model and Task and Resource Analysis. The outcome of the work resulted in a decision to modernise its entire fleet of vehicles, provide the highest standard of personal protective equipment for the staff and introduce firefighting media that would perform to the highest standard and protect the environment. This modernisation outcome resulted in the airport providing the highest standard of protection with the most up to date technology for the travelling community, employees and visitors to the airport.

Procurement Process

To ensure that best value for money is achieved, a formal tendering process has been developed for all goods and service expenditure. The tendering process has been led by the Manchester Airport Group Procurement and Contracts department.

Heather Bradley, Group Procurement and Contracts Buyer, is responsible for

facilitating the tender processes and the contract management for all of the Professional and Outsourced Services with a key focus on the Group Fire Fighting Services.

The purpose for managing the formal tender programme is to achieve best value for money in a visible way. It ensured that all of the information required from each prospective supplier was presented within a clear, concise and complete framework, and that all tenders are returned in a consistent manner to ensure that all respondents have equal opportunity.

As a department, the personnel work with Suppliers, both pre and post tender, to build relationships, manage expectations and explore the market place to establish which solution is achieved within best value principals.

The vision of the team continues to be recognised as the premier aviation procurement and contracts service provider. All 3rd party purchases of goods, works and services are procured or governed by the procurement team who manage a spend of £300m per annum working with around 1,500 suppliers.

One of the objectives within the department is to embed a Procurement Business Partner Model and produce a Stakeholder Engagement Plan for the individual airports and key business functions. Through a category management approach it allows the department to focus on key areas and functions.

Working with the Rescue and Firefighting Service managers at within MAG we have completed successful tenders for PPE with Bristol Uniforms Ltd, Helmets with MSA Safety and Environmentally friendly Fire Fighting Foams through Terberg DTS (UK) Ltd and Angloco Ltd.

Vehicles

Manchester Airport went through a robust process that looked at many Fire Vehicle manufacturers and eventually chose to order six new top of the range fire engines from the American company Oshkosh. Six of the most up to date Global Striker Vehicles were unveiled in 2014 as the

▼ Manchester Airport Oshkosh Global Striker Fleet.



Image courtesy of Ian Howarth Photography



Image courtesy of Ian Howarth Photography

▲ White Watch and Management Team line up on Runway 23L.

initial part of a £4.8m total investment in the airport fire and rescue operations.

The vehicles are equipped with the latest technology, including high reach extending turrets (HRET) – known as snozzles – with piercing tips for quick and effective access into aircraft internal compartments and forward looking infra-red (FLIR) and colour cameras.

The Advantages of the HRET technology are:

Cab operation of HRET and primary turret, removes fire fighters from the risk area, therefore promoting safer working practices of responding crews.

In low attack mode, the HRET can extinguish a ground level pool fire 53% faster than a conventional roof mounted turret. This is scientifically proven in FAA and military tests (FAA Advisory circular 150/5210-23). The precision based application reduces the amount of medias used and allows fire fighters to get to work faster and reach further when deploying media, therefore reducing response and action times. Vehicles can be positioned away from escape chutes and can extend over obstacles for rapid knockdown. The 30 degree left and right rotation of

the HRET boom allows either side of the aircraft to be reached by one vehicle, without re-positioning

The HRET can be used on undercarriage fires in dual attack mode (Foam/water and dry Powder), utilising the FLIR camera to monitor temperatures. This removes the need for fire fighters in the risk area. The hydrochem nozzle can project Monnex dry powder in excess of 80 metres at 8kg/sec, rapidly extinguishing ground level fuel fires involving large aircraft.

The extendable reach of the HRET has the ability to boom above most aircraft and attack high engine fires and APU fires and is capable of entering open aircraft doors at all levels. The HRET head can then articulate 90 degrees and with use of the FLIR can provide a cooling spray/mist to cool the internal temperatures and produce a survivable atmosphere. The piercing tip can penetrate the fuselage and introduce a water spray into the passenger cabin, the effects of which can be monitored on the FLIR. This again, reduces cabin temperature for any casualties or BA fire fighting teams, it can also be utilised to push in aircraft windows, which aids smoke/heat ventilation of the aircraft.

Other uses of the HRET are as a hydraulic lifting device, enabling fire crews to lift heavy equipment at an incident – up to 227kg. The boom can be extended to a high level, to produce a ‘bird’s eye’

view of the incident which can be viewed with the FLIR or colour camera. Images are also recorded and can be used for evidence purposes.

The Striker 6 x 6 axle configuration, with Oshkosh TAK-4® all wheel and fully independent suspension, offers a smooth ride and exceptional off-road capabilities. The on board firefighting system includes a 12,000 litre water tank, a 1680 litre foam tank and a 250kg dry chemical system for multiple agent fire suppression capabilities. The 12m vehicles can reach speeds in excess of 70mph.

The introduction of these vehicles and the technology has presented the airport with the opportunity to introduce a new operating model incorporating a completely fresh approach, adopting revised tactics and techniques to enable us to create a safer environment for our passengers, airline crews and firefighters.

Firefighting Foam

On delivery of the fleet of vehicles, a decision was made to replace the ageing foam stocks with new eco friendly fluorine free foam. After a tendering process the choice was made to purchase Ecopol from the French company Bio-Ex. Nearly 20,000 litres of foam was purchased to completely fill the 6 crash vehicles and provide additional foam for familiarisation training and calibration of the vehicles. The use of the new vehicles and foam has changed the way our crews operate and extinguish fires, the vehicle positioning and rate of attack has been modified to take account of the vastly improved performance of both the vehicles and the performance of the media.

Aside from the 6 Strikers, there will be a new Command Vehicle and a domestic fire appliance added to the fleet in the first quarter of 2016. The domestic firefighting vehicle, based on a MAN 6 cab chassis is currently being built in Germany and will have a bespoke rear equipment area built and fitted by Szczesniak Specialist Vehicles in Poland. This vehicle will compliment the response to aircraft incidents and provide an up to date custom equipped vehicle to allow initial response to the many risks that surround the airport. The vehicle will be kitted out with new rescue and extrication equipment and on board mobile data and risk information to support the response to the ever developing airport infrastructure.

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Breathing Apparatus

in 2014, Manchester Airport also made a decision to replace the current Breathing Apparatus equipment following the announcement Drager would no longer be supporting our current BA set.

Four manufacturers, Drager, MSA, Scott and Interspiro were invited to provide us with sets for a period of 3 month evaluation during which time all 4 watches had the opportunity to test the sets and complete a standard evaluation form.

- Drager provided 2 sets – PSS 5000 and 7000
- MSA provided 2 sets which had minor differences.
- Scott provided 2 different sets – Contour and Pro Pak
- Interspiro provided 3 different sets – Spiroguide II, QS II and ESA Fitting Mask.

The results of the evaluations provided an overall score from which the Interspiro Spiroguide II proved to be the preferred option, with Interspiro also providing the most competitive package.

Following delivery of 40+ BA Sets, a period of training commenced for all watches prior to the sets being introduced operationally. The equipment has been operational for 18 months and the servicing and aftercare has been exceptional, fully justifying the purchase.

Manchester Airport has been working closely with Interspiro to develop new modifications and improvements to the sets and a partnership has been forged that will see the airport trialling their new telemetry system, head up displays and communications equipment.

Conclusion

Manchester Airport Rescue and Firefighting Service is in a great position to support the growth and development of the business in line with the investment being made in Airport City and the Manchester Transformation Project.

The increase in passenger numbers and design of modern aircraft will bring new challenges that the airport are prepared and future proofed for with the equipment, kit and training that is already in place.



For more information, go to
www.manairport.co.uk

▲ Firefighter Roger Davies fully kitted out in the new PPE and Interspiro Breathing Apparatus.

PPE/Uniforms

Bristol Uniforms have supplied Manchester Airport with Firefighting PPE for over 10 years. We started with the Jaguar Fire Kit, progressing to the Ergotech PPE in 2009. We have a very good working relationship with Bristol Uniforms with an excellent service and after sales record.

When the time came to renew the PPE we looked at the options available to the industry. Bristol Uniforms have developed their latest XFlex PPE, ergonomically designed to provide the ultimate in fit and comfort as well as providing the protection for the various hazardous roles associated with the aviation industry. There is a choice of fabric of Hainsworth Titan 1220 or a Pbi Matrix Titan 1260

After trialling several options, the XFlex with its distinctive styling and protection was the preferred choice. Eighty six sets of the XFlex Titan 1260


were ordered in March 2015 and were delivered within 12 weeks.

We were also in the market for 86 new helmets. We have been using the Gallet F1SF for a number of years, but started to develop a few issues, which led us to try some of the other competitors. However, we couldn't find a suitable helmet that ticked all the boxes from design, protection, fit and aesthetic appearance.

By chance we were visited by Kevin Tomkins, from MSA, with a newly developed helmet. I told Kevin my concerns, and after listening to the concerns of other users, Gallet have developed the Gallet F1XF helmet.

The design of the helmet is fantastic. Firstly, the comfort and fit of the helmet is superb, both with and without Breathing Apparatus. Replacement parts, like the visors and eye goggles are easy to replace. The inbuilt lighting unit provides an excellent aid to safe navigation in the dark. A brilliant design is the adjustable ocular visor, to allow for spectacles to be worn comfortably.

Image courtesy of Ian Howarth Photography




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The Bulletproof Spirit – Part 2: Wellness Practices

Firefighters and medics are not invincible. They feel fear and are helpless at times. They suffer heartache, suffer with their victims, and bleed just like everybody else. Wellness practices for the spirit, or spiritual wellness, is a concept fairly new to first responders, but learning how to nurture, protect, and sustain one's spirit is critical for survival.



Dan Willis

Following are several emotional-survival and wellness principles that firefighters and medics can develop. All of them can help improve coping ability, mitigate stress, prepare a first responder to more effectively process trauma, and enhance overall wellness.

1 Serve with Compassion

Search for ways to express and demonstrate service with compassion. The virtue of service is fundamental in making a first responder feel alive and useful, while finding purpose in their work. The most meaningful things in life cannot be seen or touched, but are felt with the heart. A first responder with a healthy spirit is driven by the heart to solve problems,

help those in need, and make the world, home, community, and work better places to be. It is important to their spirit to learn to focus on what their spouse, children, community, work colleagues, and others need from them rather than what they want from others.

2 Remain Involved with Outside Interests

First responders need to remain involved in activities they found fun and interesting before becoming a first responder. Most firefighters spend significantly more time watching television and using a computer than they did starting their career. Such activities tend to keep them isolated and away from more productive, life-sustaining activities that serve to breathe life into their spirit.

▼ Christmas, 2014: Lakeside, California Fire District demonstrates their compassion each year by adopting a family in need and providing gifts and food. This year was a family with a girl who had been a serious burn victim.

3 Establish a Support System

Develop a trusted support system and discuss how they can best support and most effectively help you. Your

Captain (ret) Dan Willis served with the La Mesa Police Department for 26 years. He is a former crimes of violence, child molest, homicide detective and SWAT commander, and La Mesa's Wellness Coordinator.



Image courtesy of Dan Willis

physical, mental, and emotional health and well-being, as well as the quality of your life, all depend on their level of preparedness and the development of an effective support system that is non-judgmental, caring, and supportive.

4 Get an Annual Emotional-Survival-and-Wellness Checkup:

As a form of prevention and wellness maintenance, first responders should consult with a psychologist specializing in treating emergency first responders and trauma to determine if they are being adversely affected by past trauma and to gain insight into how to deal with trauma and stress more effectively.

The idea behind an annual checkup like this is not that “something is wrong.” Something may or may not be affecting you, but the emphasis is on getting a wellness check and discussing the previous year—both professionally and personally, as a preventative and wellness-maintenance measure. This is similar as going to a physician each year for a physical checkup.

5 Questions to Discover Purpose in Work and Relationships. First responders should determine the following

- What gives meaning and purpose to their professional and personal lives?
- What provides hope, comfort, and happiness?
- What are their ethics and character values and how can they be improved?
- How do they maintain perspective and keep in touch with the most important people in their life?
- In what ways do they work to improve the quality of their relationships?
- In what ways do they harm those relationships?
- In what ways do they show the most meaningful people in their life how much they are valued?
- In what ways do they nurture their spirit?
- Who and what are they responsible for at work and at home, and how consistently do they fulfill that obligation? How specifically can be done to improve?

6 Get More Consistent, Good Sleep

Lack of good sleep will worsen a first responder's mood, decrease their alertness, interfere with their decision-making ability, impair their task performance, cause serious emotional and physical problems, and reduce their ability to concentrate and generally think. Eighteen hours of sustained wakefulness, is equivalent to a .08 percent blood alcohol level.

7 Exercise as a Way of Life

Maintaining a vigorous and consistent exercise activity level is essential, because it will significantly reduce your stress levels, reduce your chances of getting injured, and enhance your coping abilities. Consistent exercise will reduce your chances of getting a heart attack or acquiring type 2 diabetes by 58 percent. It will also significantly reduce tension while you're off duty and enable you to get more consistent sleep.

▼ San Antonio, Texas: Firefighters bow their heads to honor those lost – There are many times more walking wounded, with crippled spirits doing their best to find healing.



Image courtesy of Dan Willis

► **2014 Tornado in Moore, Oklahoma:**
Firefighters search for signs of life with
a crippling sense of helplessness.

8 Strengthen Character

The quality of any person's character is related to their integrity, dependability, trustworthiness, dedication, compassion, hard work, and selflessness. A first responder's character can always be improved upon. Focusing on strengthening your character will help to improve over-all wellness, peace, and coping ability while providing more meaning to life and work.

9 Control

Focus only on what you can control, which ultimately is only your reaction to things, your compassion, your integrity, and your professionalism.

10 Practice Letting Go

First responders need to learn to be aware of how much they identify with negative thoughts and emotions, as well as being affected by past trauma, while learning to let such thoughts and emotions go. Work to replace negatives with more positive thoughts and feelings. Often remembering to say something like "That's not helpful" can help to release or let go of adverse thoughts and negative emotions.

11 You Are Not Your Job

Working as a first responder is merely a role; it is not who you are. You have many other roles, such as a parent, spouse, friend, coach, etc. When you identify so much with the job to the exclusion of everything else, anything that affects the job (management decisions, etc.) tends to have a devastating effect on you because everything is taken so personally.

12 We All Need Help at Times

If you ever think you may need help or are told you may need help—you are already significantly past the time of needing that help. Peer support, Department chaplains or psychologists are there to offer essential help that we all need from time to time to survive this profession.

Support from Home is Essential

The most-often overlooked pillar of support for emergency first responders is the most essential – support from home.



Image courtesy of Dan Willis

By learning how to nurture their first responder spouses, they can become hidden partners in achieving overall wellness and emotional survival.

Firefighters and medics need to create an atmosphere at home where their spouses feel comfortable to approach them to let them know that they have noticed something may be bothering you. Often we are the last to know when the job has been adversely affecting us. It is imperative for spouses to provide us with that feedback and insight that we may not be acting like ourselves. Then, hopefully we can do something about it before we turn into someone our loved one no longer recognizes.

First responders need to remember how difficult it is to be married to us, with us never being home, dealing with how the job affects us and the family, and everything else with being married to a first responder. Our spouses and children can become victims of our profession, just like we can. PTSD significantly affects all the members of the family and can be very traumatic for them as well. First responders should be asking their spouses what they need from us, what we can do to be partners in their emotional survival and wellness; so that both can work as partners to insure you, your marriage, and family, both your health and wellness, survive the profession.

Conclusion

A career as a first responder involves sacrifice, a giving of oneself, and a selfless devotion to protect and give life to others. Inherent in this noble profession is a continual assault upon your spirit. Reacting to tragedies, being immersed in heartache, while trying not to suffer with their victims makes it a daily struggle to emotionally survive.

It is not inevitable that a first responder will suffer and become a victim of their profession. The consistent practice of emotional and spiritual wellness principles can enable first responders not only to emotionally survive but to thrive throughout their career. It is imperative for first responders to work to bulletproof their spirit because the protection of their community, the quality of their personal and professional life, the happiness of their family, and the wellness of their spirit all depend upon it.

Readers interested in discussing this topic further, or having Captain Willis present an emotional survival class to your station, can reach Captain Willis at firstresponderwellness.com or dwillis1121@yahoo.com Bulletproof Spirit: The First Responders Essential Resource for Protecting and Healing Mind and Heart" can be obtained at: www.firstresponderwellness.com



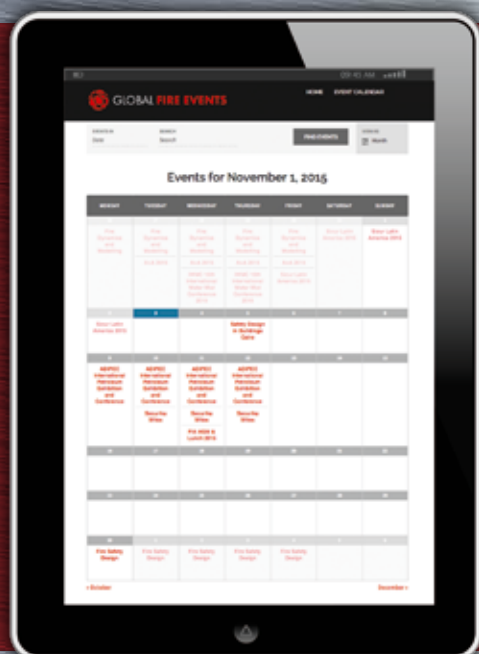
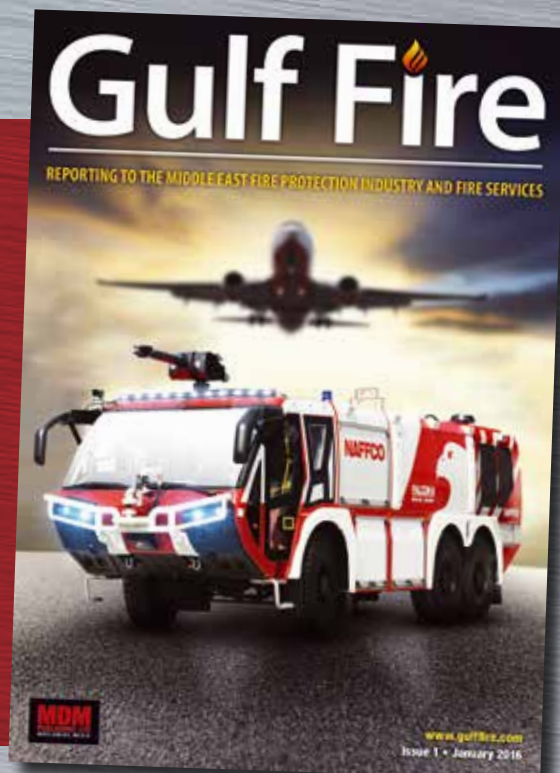
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Heavy Timber 101, Part 1: History and Design

Heavy Timber Construction (HTC), or Type IV Construction, is a term that undoubtedly every firefighter in the United States recognizes, although it might very well be largely unknown globally. Almost immediately, images of massive industrial and commercial occupancies, complete with solid-sawn timber structural frames and incredibly thick masonry walls, spring to mind. Certainly we have all learned about this historic construction type in the academy, oftentimes they are presented in the form of worst case scenarios, or veritable doomsday fire events certain to lead to line of duty deaths.



Jesse A. Heitz

Jesse A. Heitz has served as a firefighter with the Chaska Fire Department since 2012, and served as the Training Officer for the Carver County Fire Departments Hazardous Materials Response Team from 2014-2015. He is currently finishing his MST in Building History from the University of Cambridge.

However, that is an oversimplification which highlights the varying levels of inherent familiarity with heavy timber of each individual firefighter. We often say in the fire service, that “we need to understand the enemy as well as the battlefield”. We know that fire is the enemy, and spend hours engaging in worthwhile training such as fire behavior, but comparatively little time studying the battlefield, which is building construction. While a fire in a heavy timber building certainly can be a horrific event, it doesn’t have to end in tragedy. Yet, avoiding such outcomes requires firefighters to develop a deep

understanding of the iconic construction type, an understanding that spans from its history to its salient design features.

The standard industrial building design at the time of heavy timber construction’s inception made great use of small dimension lumber, a plentiful resource in New England through the late-eighteenth and early-nineteenth century. However, the exceptional fire loads present, and somewhat crude and hazardous working

▼ A 2011 photograph of Minneapolis, Minnesota’s vacant Pillsbury A Mill. The 1881 structure epitomized American heavy timber construction.



Image courtesy of the Preservation Alliance of Minnesota

conditions and methodologies during the American Industrial Revolution, led to numerous large-scale fires that all but brought New England's manufacturing centers to their knees. So commonplace and extensive were the fires during the period that insurance companies outright refused to sell insurance to factories and mills.

The story of heavy timber construction finds its official genesis in 1835 Rhode Island. It was here that a coalition of New England mill owners held a summit that sought to create a construction standard that would reduce fire-related loss. This association later became known as the Associated Factory Mutual Fire Insurance Companies, which today is better known as FM Global. This landmark convention created a distinct evolution from traditional post and beam construction. The result was the

emergence of America's first concerted effort to standardize a building system expressly designed to be fire-resistant.

Within decades of its genesis in New England, notably Massachusetts' manufacturing epicenters of Brockton, Woonsocket, and Lawrence, and of course Providence, Rhode Island, the building type quickly sprouted up in the industrial outliers of New York City, Philadelphia, and Baltimore. Shortly thereafter, it had spread rapidly into the South and arguably its greatest bastion, the Midwest. Heavy timber finally reached the West Coast at around the turn of the twentieth century, before being firmly supplanted by modern building technologies such as reinforced concrete and steel in the first decade of the twentieth century. However, it is interesting to note that this venerable construction type persisted into the first decade of the twentieth century in most of the country, but new structures were still being erected well into the 1920s on the West Coast, where the type was heralded for its ability to withstand the stresses of earthquakes.

The original early-nineteenth century tenets of this standard were quite revolutionary. The design standards called

for: large timbers of minimum nominal dimensions composing the structural frame with exceptionally heavy load-bearing walls constructed out of masonry, the elimination of sharp or otherwise protruding edges that could facilitated flame impingement, the eradication of void spaces or plenums through which fire could both hide and travel, the prohibition of unprotected penetrations of floor assemblies, and the general embrace of large open interior spans which can be in excess of 30,000 square feet. All of the aforementioned design features were instituted to not only control and contain a fire, but to ensure that fires were kept out in the open where they could be effectively combatted.

Today, the standards that regulate heavy timber construction are governed by the International Building Code (IBC), and conclusively demonstrate the utterly robust nature of heavy timber construction. For example, wood columns and trusses supporting floor loads are required to be at least 8-inches by 8-inches, beams and girders supporting floor loads are to be at least 6-inches by 10-inches, and floor decking is to be at least four total inches

▼ A 2014 photograph of the 1902 heavy timber roof assembly on the North end of the nontraditional heavy timber Guardian Angels Catholic Church in Chaska, Minnesota. From viewing this picture, one gets a clear sense of the scale of these massive timbers.



Image courtesy of the Jesse A. Heitz

► A 2014 photograph of a charred timber in the basement of Guardian Angels Catholic Church, which was reused following the 1902 fire.

thick. In real world applications, particularly of traditional heavy timber construction buildings, the timber structural frame often exceeds the minimum required dimensions by a fair margin.

In terms of required performance under fire conditions, only a portion of a heavy timber building's constituent components are specifically rated. Essentially, exterior and fire walls, along with protections for vertical openings, are required to possess a two-hour fire rating. Interior bearing walls are only required to possess a one-hour fire rating. When scrolling through the fire codes concerning heavy timber construction, one notices that the heavy timber structural members themselves do not have a specific rating. In fact, the premier fire performance testing organization in the world, the Underwriters Laboratories, ruled that such large timbers were inherently fire-resistant.

This conclusion itself highlights why heavy timber came into being in the first place, that through centuries of observation and post-fire analysis, it was noticed that timbers of large dimensions charred on the surface when exposed to flames. It was then hypothesized and later scientifically proven that the char layer insulates the interior of the timber member, thereby protecting it from the damaging effects of fire. Extensive testing in the twentieth and twenty-first centuries found that this char layer develops between 480 and 550 degrees Fahrenheit, and that such a timber loses about $\frac{1}{4}$ of an inch to charring per half-hour.

While detailed scientific experimentation and analysis can provide us with great insight into the performance of a given material, such a thought process seems to have been absent in heavy timber construction. They were designed and built in a construction era in which local resources were utilized to their fullest potential, and arguably no other building type embodied such resourcefulness. Heavy timber buildings, while constructed along common standards, made varied use of construction materials. Their masonry walls, while predominantly composed of brick, often made use of stone in areas where quarries



Image courtesy of the Jesse A. Heitz

were prevalent. In terms of the timbers themselves, it largely depended on what could be harvested locally, so timbers ranged from firs to oak. While these deviations are generally quite subtle, it is impressive that despite the particular material used, historic heavy timber buildings appear to have behaved almost identically under the stresses of fire.

What makes heavy timber construction so unusual is that it was a design conceived not by architects and structural engineers, but by business men and craftsmen. Precision engineering, fire load calculations, and ornament, simply appear to never have factored in. Heavy timber was constructed to be utilitarian, over-built to the point of structural redundancy. They were built in accordance with basic fire-resistance principles. The goal was to construct a building robust enough to withstand fire and keep it confined to a large, open, and accessible space. It was ideal if the fire could be caught in the incipient stage and quickly extinguished, if not, the stout buildings were to allow for the preservation of life through the rapid escape of occupants, with the hope that even after a large conflagration, enough of the structure would survive to allow for quick rebuilding.

These unique structures literally and figuratively carried the weight of the United States' rise to economic might, and served as the physical manifestation of American industry. They served their purpose exceptionally well, resisting fire better than any previous American building design, successfully carving out their place in history. For firefighters, they became an integral part of American fire service culture, and a frequently trodden and well-understood battlefield. However, for the modern firefighter, they've become almost mythical if not entirely intimidating. They're often viewed now as monuments to possible tragedy, as potential graveyards, rather than familiar terrain which firefighters can effectively traverse. While these buildings may have faded into obsolescence, the modern firefighter cannot allow his or her knowledge of the vaunted building type to do the same.

► In the second and final part of this article we will explore how the performance history of heavy timber indicates that they are an exceptionally fire-resistant and stable construction type.



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What Can We Do to Stop Attacks on Firefighters?

Fighting fires is a difficult job that requires a great deal of calm under pressure and the ability to perform confidently in extreme conditions. The turnout gear worn by firefighters can protect them against the extremely dangerous environments they work in, but it cannot protect them from the attacks they all too often experience.



Tom Bowman

Tom Bowman is SafeGuard Armor's foremost expert on ballistic testing, and helps provide this knowledge to people in a number of industries and professions.

On the 5th of July, a Milwaukee firefighter was called to assist paramedics with a patient. While on the scene, the 46 year old firefighter was shot and hit in the head. This is the latest in a long list of attacks on firefighters, many of which have ended in tragedy. Thankfully the brave man was not killed, yet this attack highlights the need to protect firefighters.

People sadly continue to target firefighters for attack, using weapons and missiles in a number of attacks to cause damage and injury. The majority of these attacks are ambushes, and involve firefighters being attacked and occasionally prevented from escaping after being called to a fire, whether real or not. This makes the situation very difficult for firefighters and there have been several suggestions as to how to make things safer.

▼ **Providing Bullet Proof Vests to Firefighters is a simple way to help keep them safe in dangerous environments.**

How Can We Make Things Safer?

Firstly, some have suggested that extra training for firefighters may help them deal with dangerous situations. Training ranges from negotiation and mediation to martial arts and self defence, all of which have been suggested as possible solutions to dangerous situations. This presents several problems, and even without the extra time and cost it would take in a profession that already carries a great deal of stress, it would simply not suffice in most situations. Those who do attack firefighters often do so from range, and are certainly not capable of being reasoned with.

Secondly, it has been argued that firefighters need not be the first responders to some emergencies, and that where danger seems likely the police should respond to emergencies before allowing firefighters to attend the scene. This is immediately and obviously problematic, and would prove to be a great drain on resources for both departments; Law



Image courtesy of SafeGuard Armor

Enforcement has enough problems to deal with without checking scenes for the Fire Department. Similarly, firefighters will attest to the need to respond to emergencies quickly, and the last thing they need is another service in their way. Just as problematic however would be deciding when it was appropriate to call the police to these situations. For example, some may say that in emergencies in 'dangerous neighborhoods' the police should respond first; yet in one of the most recent tragic attacks, firefighters were called to a New York suburb with very little previous history of crime.

Clearly, those who for whatever reason choose to target firefighters cannot be swayed from their goal, and do not belong to one particular group of people. Firefighters cannot be expected to stop responding to emergencies, nor can they be expected to do so without the proper protection. Therefore it is imperative that a solution be found for these brave men and women. One such solution is to equip firefighters with body armor.

How Can Body Armor Help?

Many think of body armor as the domain of the Military and Law Enforcement, and the idea of a bullet proof vest is often seen as incongruous with the Fire Service. However, body armor is lighter, thinner, and more protective than ever, and is a simple solution to the problem of attacks on firefighters. Sadly, firearms are readily accessible for the vast majority of people, both legally and illegally, and ballistic protection is a necessity for firefighters. Bullet proof vests that are capable of stopping handgun ammunition are easy to wear and allow for a wide range of movement, but not every firefighter will feel the need for ballistic protection.

Violent attacks involving guns happen far too often, and even one instance is one too many. However, far more common are attacks in general that may involve other weapons, projectiles, or even no weapon. These attacks can still be incredibly damaging and even fatal, and it is important that protection is available for these situations. Body armor is still a useful solution, as a bullet proof vest can protect against a number of threats. For example, many do not realise that the protective fabric used in bullet resistant vests is capable of absorbing and dispersing a large amount of energy, meaning that it



Image courtesy of SafeGuard Armor

can negate much of the damage caused by blunt trauma and brute force. This is useful for firefighters who are increasingly called to dangerous situations involving explosions, falling debris, or traffic collisions. In these instances a bullet proof vest can save a life, even where no attack takes place.

Firefighters have always been required to attend the most dangerous and catastrophic situations, and being able to protect them in these instances is just as important. Attending disasters of any kind will bring with it specific dangers, and body armor is a useful tool in protecting against these. It has already been noted that a

▲ Covert Body Armor can be worn comfortably under a uniform even for extended periods.

bullet proof vest can protect against things like falling debris, but there are also significant developments being made in body armor that can protect against CBRN (Chemical, Radiological, Biological, and Nuclear) attacks. Whilst these CBRN protective membranes are not yet a standard part of body armor, the NFPA 1971-2007 edition, which sets the standards for protection, already includes an optional section covering these threats.



Image courtesy of SafeGuard Armor

◀ **Full Tactical Armor may be necessary for some Firefighters working in especially hostile situations.**

and rushing to prepare for an emergency, firefighters will not have to worry about their protection. Similarly, some of these covert vests incorporate temperature-regulating technologies to help draw moisture away from the skin and keep the wearer cool.

Moisture is significant problem for firefighters, as build-up underneath clothing can lead to serious burns because of the extreme temperature, and if nothing else the nature of their turnout gear prohibits moisture from escaping properly, thus preventing sweat from cooling the skin. A layer of temperature-regulating material will not only help cool firefighters down, but will keep the moisture away from the skin, preventing any build-up and subsequent burns.

Things for Firefighters to Consider?

There will be many situations where body armor is simply not necessary, and wearing a covert vest would only hinder the firefighter whilst providing unnecessary protection. For these individuals an overt vest may be better, as it can simply be equipped when it is felt appropriate. Many overt vests are available with zips, Velcro and quick-release clips, making them incredibly easy to put on and take off. This means that adding them to the equipment needed will not increase response time, while still providing appropriate protection.

Having armor available is incredibly important because of the dangerous situations noted previously. However, as mentioned in the last paragraph, there will be many occasions where a bullet or stab proof vest will simply not be needed, and making armor mandatory will only make an already difficult and dangerous job much more so. Providing firefighters with armor, without making it mandatory, allows them to choose whether or not to wear, ensuring that they can stay protected in the most dangerous of situations, without hindering their ability to defend and service our communities. Many departments have already taken steps towards this, and providing body armor to firefighters is an easy and effective solution to a sad and potentially deadly state of affairs.

➡ **For more information, go to www.safeguardarmor.com/articles**

What Types of Armor Are Available?

Of course, attacks do continue to happen, and protection against other weapons will require different armor. Bullet proof vests use soft materials like Kevlar to provide a lightweight yet strong surface capable of dispersing energy and trapping bullets. However, other weapons like knives, needles and broken bottles cannot be properly stopped by these materials; the sharp edges will cut through the fabric and penetrate the vest, while spiked weapons can pass through the minute gaps in the fibers. Incidents of firefighters being stabbed continue to occur, and these weapons will require their own protection. Stab and spike proof vest use materials like chainmail and/or plastic laminate to help protect the soft materials beneath and, of course, the wearer.

The need for body armor seems self-evident as reports of attacks on firefighters

continue to be spread by the media, and the wide range of potentially dangerous environments they are called to only continue to increase. However, one of the problems with body armor for firefighters is the unique situations they find themselves in, and the difficulties they face with body armor. The main duty of firefighters is to tackle fires and fire-related incidents. This naturally makes for incredibly hot scenarios that will only be compounded by the presence of a bullet proof vest. The last thing most of these brave men and women need is more equipment that can get in the way or even increase their discomfort.

However, bullet proof armor is increasingly comfortable and lightweight, and can be worn in a variety of styles. Covert vests in particular may be beneficial to firefighters, as they can be worn underneath clothing or a uniform comfortably for extended periods. This means that when putting on turnout gear

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Vimpex Ltd is a trusted and renowned specialist supplier of Rescue Tools and associated products to the Fire and Rescue Services, Police, Paramedics and the Military. An important part of Vimpex's specialism is in the supply of rescue tools. As the Europe and Middle East master distributor for Ogura Battery Powered Hydraulics, Vimpex has established multiple key reference sites throughout the region since the product's launch in 1999.

Vimpex has supplied many sets of Ogura Rescue Tools to the airport fire market, which is testament to how ideal Ogura products are for this type of work. The compact and lightweight nature of Ogura tools means that they are ideal for use in confined spaces such as aircraft fuselages and collapsed structures. With a surprising strength to weight ratio, Ogura tools are the ideal rescue tool for USAR, immediate response, confined space rescue and awkward to reach places.

Vimpex is committed to ensuring that any users of Ogura Hydraulics are fully trained in their use, maintenance and repair. That's why any regional agents are very heavily vetted to ensure that whoever is trusted to deal with Ogura tools in their region can fully support the product in the field.

 For more information, go to www.vimpex.co.uk



LANCIER

When wreckage hinders rescue efforts, rescue tools by LANCIER rescue systems provide effective support. Powerful, precise and technically sophisticated, they enable rescue services around the world to remove obstacles rapidly – thus gaining valuable time during an operation.

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- Excellent value for money
- Outstanding results following decades of continuous development work
- Constant exchange of experiences with users around the world



The portfolio of rescue tools by LANCIER rescue systems covers hydraulic cutting and spreading equipment as well as combi tools, rescue rams and hydraulic power units.

Not even the side sill panels of upper-class SUV vehicles are a major challenge for the most powerful cutting tool on the market called CU-235/163. The cutting force of 358650 lbs makes it possible.

In addition, the new spreading LANCIER rescue systems tool SP-645/100 is a very strong but still compact tool.

 For more information, go to www.lancier-hydraulik.com

LUKAS

As firefighter in a tactical rescue or rapid intervention team you need to arm yourself properly. The StrongArm from LUKAS can help you do just that as it provides you one powerful, yet portable tool that can cut, lift, spread and replace crowbars, halligan bars, wire cutters, axes, and so much more.

The new tool is manufactured from heat-resistant material and is equipped with a heat-resistant battery. For convenience of use the handle can easily be switched into four positions. Due to large buttons the combination tips and door opener tips can be easily changed out.

The StrongArm cuts 13mm rebar and 10mm chain links. It comes with two sets of tips (combination and door opener), Li-Ion rechargeable battery, charger and offers a Protection Class to IP54.



 For more information, go to www.rescue.lukas.com



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Product Features

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- 20-minute charge time w/SMART charger
- 2-year limited warranty (except cutter blades)



Weber Rescue Systems

At Interschutz 2015 Weber Rescue Systems brought the highly efficient battery-driven rescue tools of the E-FORCE 2 series to the market.

Equipped with a new, efficiency improved drive unit for longer working time and higher operating speed these new tools fulfill the highest requirements of modern rescue.

The new drive unit is retrofittable for E-Force tools Generation 1 and their predecessor, the mobile rescue tools Mann-mobil. LED lights which have been integrated into the housing are serving for better view in the working area. The new 5.0 Ah battery (28 V Li-Ion) in combination with the new efficient drive ensures a long operation time.

The rocker switch enables a sensitive

controlling with one hand. The open and close movement of the red rocker is intuitive and because of its concave and convex shape very reliable. The fiber-reinforced case is made for hardest use. Finally the new E-FORCE 2 tools offer a well-balanced weight, unique handling and modern design.

Like E-FORCE 1 the Li-Ion battery is compatible with the battery of the MILWAUKEE battery-operated saws because of the standard housing.

The range of tools goes from battery driven standard tools like spreaders, cutters, combi tools and rescue rams to specialized tools, e.g. the concrete crusher, door opener and power wedge.



For more information, go to www.weber-rescue.com

RESQTEC

With the introduction of the Resqtec battery tools a new era starts for rescue extrication. Electronic Direct Drive (EDD) Technology has eliminated hydraulics; no fluids, pump, valves or seals. It is simply one compact, powerful and efficient motor that drives a screw.

Each component used in a rescue tool requires energy. EDD excludes hydraulic components to significantly reduce efficiency loss and to deliver long run times at full power. Powered by the latest lithium-ion technology, EDD batteries also conform to IEC 62133 safety standards and UN 38.3 shipping requirements.

Integrated hydraulic rescue tools get

force by building up pressure. EDD is direct: it delivers a constant maximum force, which results in great cutting and spreading performance.

Hydraulic systems don't allow full control over its speed. With a control handle that works like an accelerator, EDD however lets you be in full control. Hydraulic systems overheat, whereas EDD is not affected by heat issues. This allows much longer running times, no influence by extreme environments and low maintenance needs.

Hydraulic rescue tools work at high pressures and are carried close to the body. EDD contains no hydraulic fluid, meaning no pressure and compression. Compression of hydraulic fluid creates spring reaction forces. EDD has no such fluid compression, making it the safest choice for rescuers.



For more information, go to www.resqtec.com

Paratech

Paratech's MULTIFORCE Air Lifting Bag takes lifting to a whole new level.

Integrating the latest technology with a unique understanding of lifting, Paratech has designed the MULTIFORCE Air Lifting Bag to exceed expectations. Ease of use and speed Paratech's MULTIFORCE Air Lifting Bag takes lifting to a whole new level. Integrating the latest technology with a unique understanding of lifting, Paratech has designed the MULTIFORCE Air Lifting Bag to exceed expectations. Ease of use and speed of deployment make the MULTIFORCE Air Lifting Bag an obvious choice whether the goal is saving lives or lifting locomotives.

Paratech's patent pending design ensures that the high lift of this system

can get into the tightest places possible, while the innovative remote lifting base keeps personnel safely away from the load when positioning the MULTIFORCE Air Lifting Bag. A dual stage feature keeps the load steady as the bag inflates so load drift is minimized and safety relief valves are integrated into the bag itself making over-inflation completely impossible. No mechanical coupling between air chambers means a stronger and safer lift. The remote lifting base doubles as a storage device keeping the bag safe and making it extremely easy to store.

Get MAXIMUM IMPACT with our new Rapid Extrication Kit – Paratech Rescue Struts to stabilize and Multiforce Air Lifting Bag to lift. A fast, simple and safe solution to vehicle rescue.



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LEADER

Training the Fire Investigator of the Future: A Standards Based Approach

With the publishing of “Strengthening Forensic Science in the United States: A Path Forward” by the National Academy of Science in 2009, a shot was fired across the bow of the various forensic disciplines, specifically including forensic fire investigation – a duty and responsibility inevitably passed on to every fire department charged with serving their community. While this white paper was critical of the various forensic disciplines, it did provide recommendations to improvement through the implementation of standards based training and proposed credential based certification and accreditation.



Robert J. Schaal

Robert J. Schaal is a past president of the International Association of Arson Investigators (IAAI) and currently serves as the Chair of the IAAI Training and Education Committee. He is currently a consultant/forensic investigator with Gulf Coast Fire Investigation, Research, and Education, a fire investigation and training consulting firm based out of Mandeville, Louisiana and works as a subject matter expert consultant to the IAAI CFITrainer.Net® project.

Fortunately, there are existing pathways to improve training and credentialing through state and national/international organizations offering programs and certifications based on NFPA 1033, Standard for Professional Qualifications for Fire Investigator. These programs routinely provide training to the various performance elements presented in NFPA 1033 and utilize the complementary document, NFPA 921, Guide to Fire and Explosion Investigations, as the primary point of reference. NFPA 921, a consensus document revised on a three-year cycle serves as the primary reference source

outlining the body of scientific fire investigation knowledge utilized during the course of forensic fire investigations and establishes use of the Scientific Method as a fundamental requirement of a competent fire investigation. To add credibility and oversight to the various credentialing organizations, the National Board on Fire Service Qualifications (ProBoard) and the International Fire Service Accreditation Congress (IFSAC) have established a review and accreditation process that ensures these programs appropriately test to the identified standard.

Fire Investigation is a complex endeavor requiring a comprehensive understanding of scientific concepts and appropriately applying this knowledge in a quest to identify the origin and cause of a fire incident. A properly trained fire

▼ The use of competency based training and certification systems help develop a highly effective fire investigation team.



Image courtesy of International Association of Arson Investigators



Image courtesy of International Association of Arson Investigators

investigation unit is a critical component of an effective fire prevention strategy and can be a key contributor to a successful fire safety and public education program. One of the key goals of a competent fire investigation is accountability. The fire investigation team is responsible for accurately determining the origin and cause of fire incidents and the findings can result in the holding of individual accountability in criminal litigation, potentially depriving citizens of their civil liberties. Another function of the fire investigation process is to identify deficiencies or defects in products or components so manufacturers, installers or others are held accountable, leading to the issuance of safety recalls or corrections to the design, manufacture or installation protocols resulting in improved public safety. The identification of structural design deficiencies or defects that adversely affect fire growth and development can also support the advancement of building codes and life safety codes, increasing public safety throughout our communities.

With so much at stake in criminal and civil litigation, fire investigators and their work product are under increased scrutiny in court or other proceedings. Daubert challenges (or other equivalent challenges to the qualifications, training,

practical experience, and credentials of an investigator prior to proffering expert opinions in court or judicial proceedings) are routine with a focus of attacking or questioning whether an investigator meets the national qualifications standards outlined in NFPA 1033 and attempting to disqualify or limit their expert testimony in legal proceedings. These challenges also focus on whether the investigator appropriately utilized best practices or recommended guidelines outlined in NFPA 921 during the course of their investigation. Challenges to historic cases and previous judicial findings are also on the rise as the Innocence Project and like organizations expand their focus from DNA related cases to include deficiencies in eyewitness testimony and forensic practices, specifically including fire investigation. Civil action against public service agencies alleging the effective equivalent of professional malpractice because of nonadherence to national standards and investigative protocols have been initiated on behalf of individuals that have allegedly been falsely accused of arson or have been granted post trial relief during appeal or judicial review. This increased scrutiny places our public agencies and their investigators at increased risk of civil exposure and in extreme cases, allegations of criminal misconduct related

▲ **Fire investigator qualifications and work product are coming under increased scrutiny in legal proceedings.**

to significantly deficient investigations resulting in false arrest and malicious prosecution.

The time has come for the fire service to recognize the increased risks and scrutiny the performance of their duties will encounter in both the civil and criminal environment. Fire investigators and the findings of their investigations will encounter more challenges and critical review, especially when civil liberties are at stake. It is critical that we heed the warning signs and work together to ensure ongoing training and professional credentialing become commonplace within the fire service. The fire service has a long tradition of providing fire suppression and life safety training to their personnel, routinely utilizing codes and standards as the foundation. It is now time to expand these efforts to incorporate fire investigation personnel ensuring that they have the proper knowledge, skills, and abilities to perform their delegated duties in an effective and efficient manner. Utilizing NFPA 1033 as the guiding document to establish internal job descriptions, evaluation documents

▲ CFITrainer.Net, a distance learning platform developed by the IAAI, is an effective tool to obtain high quality training based on the tenets of NFPA 921 and NFPA 1033.

and training protocols the public service agencies can move toward ensuring they employ an effective investigative team that properly supports their comprehensive fire prevention and fire education strategies. Applying a blend of internal training requirements and the utilization of external training resources and credentialing systems, public agencies can ensure that their personnel are well equipped to serve the public within their respective communities.

Fortunately, a network of organizations dedicated to the fire service and forensic fire investigation have embraced the tenets of NFPA 1033 and NFPA 921 and are paving the pathway to highly trained and properly credentialed fire investigators. Working with resources made available through the Assistance to Firefighter, Fire Prevention and Safety grant, the International Association of Arson Investigators (IAAI) has established the CFITrainer.Net® distance-learning platform. This platform is available free of charge to all users, and provides foundational training based on the topical requirements defined in the administrative

chapter of NFPA 1033. These training modules, designed at the knowledge and understanding level of the cognitive educational domain, provide a resource for fire investigators to develop a knowledge base that can be further developed and enhanced through participation in residential training programs and through gaining real world experiences. This continuum of continued professional development allows investigators to build an effective portfolio or curriculum vitae that will prepare them to successfully challenging the application requirements of recognized and accredited professional credentialing systems based on the accepted industry 1033 standard. This recognition by independent agencies or organizations adds a layer of credibility that will build confidence within the forensic fire investigation community, the legal community, and with the public at large.

As the fire service has embraced standards based qualifications and testing for firefighters, fire officers, and other specialty positions, it is now time to adopt and apply this same concept to the fire investigation profession. Having competent and qualified fire investigation personnel will protect the agency from increased scrutiny and litigation while serving to support the fire prevention strategy through the conduct of competent fire investigations

that accurately identify fire causation factors leading to the identification of remedial or preventive factors including code revision, policy changes, and product revision. The path to progress is clear and is readily available. Public service agencies must commit to adequately embracing and supporting their fire investigation mission by dedicating appropriate personnel to this critical mission and allocating appropriate equipment and resources to ensure successful professional development. The benefit of an effective investigative team is real and now is the time to move toward aggressively training dedicated personnel to the accepted national standard. Working together, we can continue to improve the fire investigation industry and meet the goals and expectations presented in the "Path Forward" report. By continually working toward requiring properly qualified and credentialed fire investigators, the fire service will improve their perception within the forensic fire investigation industry and be adequately prepared to face and repel the challenges of public and legal scrutiny. Now is the time to move toward increased competency based training for fire investigators, as the risk of adverse action is real and gets stronger every day.



For more information, go to
www.firearson.com



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Firefighters can count on **SPOT** and **fiResponse** for back-up communications and an extra lifeline in emergency situations.



See Technosylva.com for further information.

Communications and Support for Fire Crews from Space

As fire authorities strive to improve operational efficiency, and to better safeguard crew, they are increasingly turning to state-of-the-art satellite communications technology.



Gavan Murphy

Gavan Murphy is Director of Marketing, EMEA at Globalstar. Based in Globalstar's European HQ in Dublin, Gavan is responsible for the development and implementation of Globalstar's marketing strategy across the European, Middle Eastern and African regions.

Castilla La Mancha is a vast region in central Spain. With its dry and often very hot climate, forest blazes and wildfires are a fact of life for people and businesses in the region. Junta de Castilla La Mancha, the administrative authority whose responsibilities include forest and wildfire management, employ some 2,000 response personnel who are always on standby to help keep forest and wildfire at bay.

The local administration decided that it should invest in new technology to help its team more effectively contain and extinguish fires. Moreover, the administration recognised a need to help crews communicate better in emergency situations and to enhance safety in the extremely dangerous situations they routinely face.

Junta officials started talking to wildfire solutions specialist Technosylva, provider of fire behaviour analysis and

management software, to learn about what options were available.

Joaquin Ramirez Cisneros, Principal Consultant at Technosylva, explains why Globalstar's SPOT Gen3 was chosen to meet the Junta's requirements as an integral part of his company's Wildfire Management System, fiResponse.

"To keep firefighters safe, it is critical to know where exactly they are at all times," he explains.

"The positions of the crew members need to be known in relation to the engine and equipment resources being used, and it is particularly important to know how far away they are from the heart of the fire. Providing these professional teams with the communications and support they need in the extremely dangerous situation of wildfire is an absolute must."

SPOT Gen3 is a rugged, pocket-sized, affordable personal GPS messenger that helps users stay connected. Because it uses satellite technology, users do not need to worry about whether there might be a GSM signal.

Ramirez Cisneros points to two major benefits for firefighters: the SPOT Gen3's

▼ **fiResponse software enabling accurate tracking of firefighters and equipment while helping enhance fire management.**

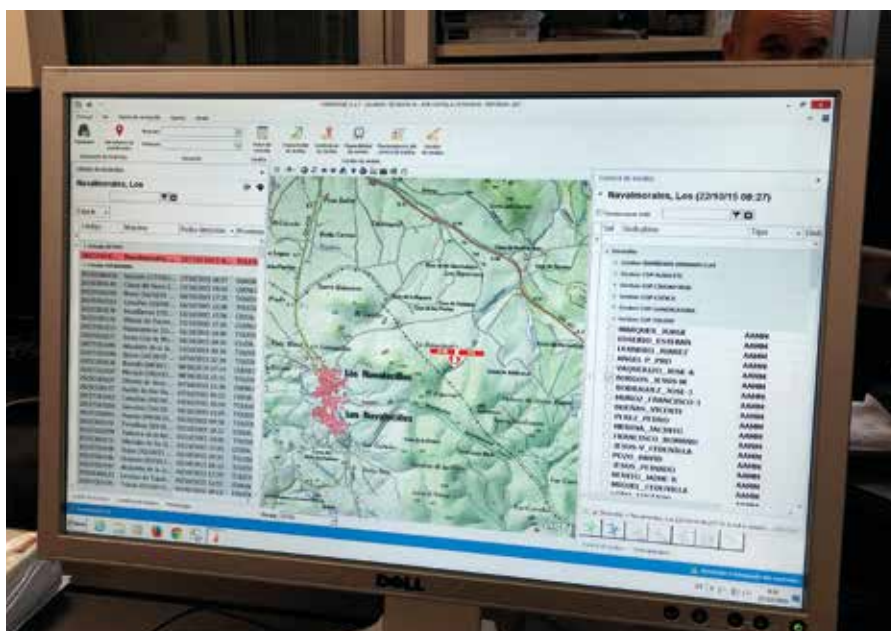


Image courtesy of Globalstar



Images courtesy of Globalstar

▲ SPOT Gen3 from Globalstar helping firefighters stay in touch even when outside of radio or GSM range.

integrated sensors that report when the device is moving and its ability to be powered by USB.

And he should know. Prior to the new deployment with Junta de Castilla La Mancha, he has provided mission-critical technology to fire-fighting organisations in Spain, USA, Canada, and in Chile.

If a firefighter needs help urgently, with the single press of a button on SPOT, emergency services are alerted, his or her GPS coordinates will be transmitted, and a rescue operation is initiated. Emergency services co-ordinators can precisely track each fire fighting team's location, via a user-friendly display of GPS positions in near real-time on Google Maps. To date, over 3,900 rescues have taken place around the globe thanks to SPOT.

SPOT Gen3 provides off-the-grid messaging, emergency alerts, extra long battery life, and extreme GPS tracking, with track check-points capable of taking place as frequently as every 2½ minutes. Co-ordinators can use the convenient SPOT App to easily view their SPOT messages, show user's track points and monitor people or assets via a smartphone or tablet.

Additionally, with the SPOT Trace satellite tracking devices attached

Communications and Safety for Firefighters

Improving working conditions and welfare for fire crews, for whom working in potentially hazardous environments is simply part of the job, is essential. Providing remote working fire crew with the communications capabilities to help improve worker safety surely go a long way to improving morale.

With every new emergency situation, the team needs to quickly assess what is needed and to deploy the crew and equipment to the right places at the right times. Traditional radio communications can work well, but in any region that is remote, radio, and even GSM mobile, might not be reliable enough.

When multiple agencies are co-ordinating fire containment, rescue and recovery operations, they need to be able to communicate reliably and speedily to make operational activities proceed more smoothly and efficiently. Reliable connectivity helps alleviate the stress we all experience when we need to make an urgent call or send a vital email, yet no matter how hard we try, we simply can't get a stable Wi-Fi or 3G/4G signal.

To add to the safety imperative, access by emergency services can often require specialist support such as an air ambulance. All told, remotely working fire crew require a communications system they can trust, rain or shine, and that enables an always-on link with colleagues. A satellite-based communications solution offers the only viable communications lifeline.

Improve morale, improve efficiency

Being able to stay in touch with home boosts morale and welfare among crew who are away for extended periods of time. They need an easy way to call friends and family, and with today's stretched public budgets, ideally one which is low-cost.

A new low-cost device is now able to deliver that welfare-enhancing connectivity that crews demand more and more. With Sat-Fi from Globalstar, wherever they are, crew can keep in touch with colleagues and family using their own smartphones, tablets and laptops.

Using a Sat-Fi satellite hotspot, which is the world's most powerful in its class, crew members can make and receive voice calls and email using an app that runs on any Wi-Fi enabled device. Up to eight users can use their own phones to make and receive calls and get online over Globalstar's next-generation satellite network, even if they are in remote regions.

A Sat-Fi satellite hotspot offers connectivity up to 100 feet from the antenna. It's also easy to set up – users simply download the Sat-Fi app from Apple iTunes or the Google Play store and the app connects to voice and data services. It also provides access to emergency services when required.

Once the user-friendly concept of 'Bring Your Own Device' (BYOD) was confined to the office. Now, thanks to satellite technology, it is extended out to the world's most remote regions, bringing new-found freedom and safety for remote rescue teams everywhere.

to pumps, helicopters and aerial fire apparatus, operations coordinators can know precisely where their resources are, where they need to be, and how much time it will take for them to get there.

Affordable, reliable connectivity and real-time GPS tracking is a daily reality for SPOT users, providing reassurance to colleagues and family when there is unreliable or no mobile coverage.

One can hardly think of a job that is

more important and yet more dangerous than trying to contain and extinguish out-of-control forest and wildfires. State-of-the-art satellite communications now form an important part of modern firefighting. Globalstar is extremely proud of the role that SPOT and its satellite network play in supporting firefighters in their efforts.



For more information, go to
eu.globalstar.com

BREAKING INTO THE HEART OF DANGER

When comes the time for facing situations of extreme danger, for protecting your companions and saving the lives of others, the only thing that matters is to do so without worrying about yourself. Every day, all you have to do is make the right choice, is choose the right partner to watch your back.



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Helmet VFR EVO

EN 16471:2014
For wildland fire fighting
EN 16473:2014
For technical rescue
EN 443:2008
For fire fighting in buildings
and other structures

New Research Studies Cardiovascular and Chemical Exposure Risks

Firefighters around the world are facing increasingly complex challenges on the fireground, including evolving health and safety risks for the responding members of the fire service. Using statistics from the United States alone, there is compelling information available that suggests firefighting increases the risk of sudden cardiac events and the chronic risk of certain cancers.



Gavin Horn



Denise Smith



Steve Kerber



Kenneth Fent



Mark Mordecai

Gavin Horn, PhD, Director of Research, University of Illinois Fire Service Institute.

Denise Smith, PhD, FACSM, Research Scientist, Illinois Fire Service Institute; Professor, Skidmore College.

Steve Kerber, Director, UL Firefighter Safety Research Institute.

Kenneth Fent, PhD, CIH, Research Officer, National Institute for Occupational Safety and Health.

Mark Mordecai, Director of Business Development, Globe Manufacturing Company.

Based on reporting from the National Fire Protection Association (NFPA) and U.S. Fire Administration, it is well established that sudden cardiac events are the leading cause of duty-related deaths among firefighters in the United States. Research has also found that sudden cardiac events are far more likely to occur after fire suppression activity. Epidemiological evidence obtained over many years indicates that the strenuous physical activity can serve as a *trigger* for an acute cardiac event.

▼ Collection of a blood sample from a firefighter participant for measuring changes in blood chemistry after fire suppression.

Modern Firefighting Concerns

At the same time, the use of synthetic materials in homes and office buildings has increased over the last few decades. During building fires, the combustion of synthetic materials, such as insulation, furniture, and carpeting, releases toxic chemicals into the air. Uncontrolled exposure to these toxic chemicals can cause serious, adverse health effects in humans, increasing the risk of cancer, cardiovascular, and respiratory disease development, or even causing death.

Despite this evidence, and serious efforts to lessen cardiovascular disease and cancer risk in the fire service, there is a still a pressing need to gather sound information on the effects of firefighting in *realistic* fire scenarios on markers of cardiovascular and carcinogenic risk. To address this gap in knowledge, a recent study was conducted



Image courtesy of Illinois Fire Service Institute



fires. These studies have characterized potential chemical exposures – particularly focusing on possible and known carcinogens and inorganic gasses – that are produced by fires, as well as measuring what is deposited on firefighting personal protective equipment (PPE) and what gets through the gear and on to the skin. Systemic exposure, measured by what is found in the firefighters' body, has been quantified through breath, urine, and blood samples. While this data provides an important glimpse into the risks faced by the fire service, comprehensive exposure monitoring of firefighters performing typical tactics during full size structure fires with typical contents had not been performed prior to our recent study.

Physiological Responses

Research at IFSI has focused on characterizing the thermal and cardiovascular strain of firefighting activities. In particular, studies have documented changes in core temperature, plasma volume, blood chemistry, hormonal and immunological factors, heart and vessel function, and coagulatory potential in response to different firefighting scenarios. The vast majority of research investigating the physiological responses to firefighting has been done in training structures using wood and straw (Class A materials) as fuel or in laboratory conditions. These settings were the logical place to begin rigorous, well-controlled examination of physiological responses, and have conclusively shown that firefighting causes significant cardiovascular strain that could potentially trigger sudden cardiac events in vulnerable individuals. However, the physiological disruption caused by actual firefighting activities could result in even more exaggerated responses. Despite all the efforts to develop protective equipment and clothing and to devise policies and procedures to protect firefighters from exposure to the detrimental effects of heat and toxic exposures, we still do not fully understand how the modern fire environment can affect firefighter health. In addition to rapid changes in temperature, the modern fire environment also produces products of combustion containing hundreds of chemical gasses or particles with different potential toxic effects.

Until now, a detailed integration of research on fire dynamics, toxic

▲ Attaching air monitoring equipment to turnout gear for measuring chemicals during the fire.

at the Illinois Fire Service Institute (IFSI) along with partners at Underwriters Laboratories (UL) Firefighter Safety Research Institute (FSRI), the National Institute for Occupational Safety and Health (NIOSH) and Globe Manufacturing Company.

Studying Real Fire Scenarios

The 'Cardiovascular and Chemical Exposure Risks in Modern Firefighting' study brings together expertise from these leading agencies in a single project. Recent work by UL has shown that temperatures during room and contents fires in buildings using typical construction materials and polymer-based furnishings found in many homes in the early 21st century increase more rapidly than temperatures reported

using legacy furnishings of natural materials. Through years of research and several hundred full-scale live-fire burn tests, UL FSRI has developed a robust instrumentation suite to characterize temperatures, heat flux, pressures, gas concentrations, and visibility. However, these past studies have not had the opportunity to include firefighters – and the variability that the human element introduces – as an integral part of the outcomes. To support the current study, a fully instrumented single-story, ranch style structure based on a structure developed for a series of UL FSRI laboratory tests was constructed on the IFSI training grounds in Champaign, Illinois.

Measuring Exposures

NIOSH team members have studied firefighter exposures from a wide variety of environments, from training scenarios to diesel exhaust to small room and contents

Image courtesy of Illinois Fire Service Institute

► **Monitoring of multiple variables (e.g. temperature, pressure, gas concentrations, heat flux) within the instrumented burn building.**

exposures, and cardiovascular strain has been lacking. To make informed risk management decisions, the fire service needs rigorous scientific data describing the effects of firefighting in modern structures with realistic fuel loads on firefighter cardiovascular and cancer risk. Furthermore, it is important to understand how these risks are affected by firefighting tactics, riding position, and control interventions (such as field-based decontamination). The current study focuses on the intersection of each of these areas of study and does so with a focus on modern fire service response scenarios.

Research Methodology

Over the summer of 2015, firefighters from departments across the United States traveled to Champaign to participate in this study. These firefighters were deployed in teams of 12 members, operating in two person groups to conduct common functions, including Suppression, Search and Rescue, Command/Engineer, Outside Vent, and Overhaul (four members). Each group of 12 firefighters took a run at the structure using both interior attack tactics and a transitional attack approach. In all 12 scenarios were conducted with response timelines that might be expected on the modern fireground, which provided abundant data on chemical exposures, physiological changes, and fire dynamics. In addition to data obtained before and immediately after firefighting, these scenarios allowed tracking of blood, vascular, electrocardiography measures, and biological levels of contaminants for up to 12 hours after the event. This is an important component of the study given the number of sudden cardiac events that occur in the hours after emergency operations and the potential for ongoing exposure after the fire. The effectiveness of field-based decontamination of PPE and skin cleaning on reducing exposure risk was also quantified as part of this study.

► **Field-based wet decontamination of recently used turnout gear.**



Images courtesy of Illinois Fire Service Institute

For More Information

At the time of this writing, the research team is hard at work analyzing samples, studying data, and statistically characterizing the results. An interim report is slated for release in late 2015 or early 2016, while a detailed fire service toolkit will be released in 2017. The toolkit will be made freely available to firefighters and fire officers around the globe. In the meantime, you can keep up

to date with information being released by IFSI (<https://www.fsi.illinois.edu/content/research/>) or on Twitter @IFSIRESEARCH and UL FSRI (<http://ulfirefightersafety.com/>, <https://www.facebook.com/ULfirefightersafety> or on Twitter @UL_FSRI).



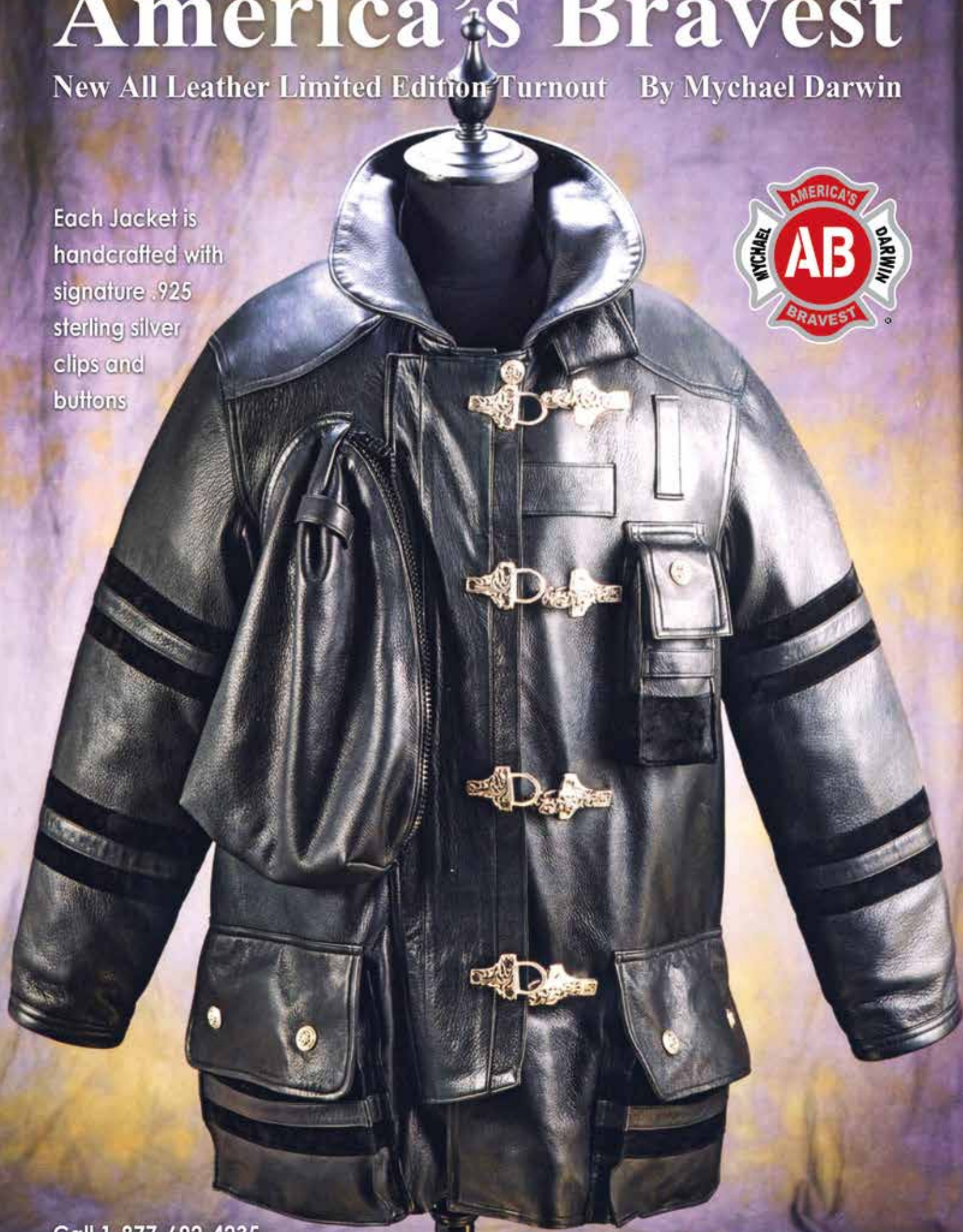
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Spreading like Wildfire

Normally I'd ask a readership to picture this scene, but I'm guessing you don't really have to. So imagine – or bring yourselves back to – the snap of burning trees, a wall of heat, and smoke clouds searing the horizon, which stretches across acres of fragile country. Flames whip the air hundreds of feet up, raging and unquenched. Not often is a reminder of our powerlessness so thoroughly realised, because it is fire of the most primal kind, kindled from a planet that's heating up ever faster for our sins.



Joshua Potts

Joshua Potts is a freelance writer working within technology and commercial business.

Huge tracts of land are at risk from wildfire, homes and communities, too. It is a rebuff to our illusion of control, our perceptive sense of confidence, the great natural display that makes you think the way a child might at a distant star. It's only good to know the scale of what we're up against. And in the case of fighting wildfire, having that perspective is vitally important. If our climate is becoming more hostile, we must adapt to it, and that means invention and staying alert for new ideas.

Luckily, a fairly novel concept is rising from the margins of public awareness to join the fight against the world's deadliest blazes. UAV drone technology is advancing at a rapid rate; its use in the construction industry, as a means of mapping terrain and supporting logistical operations, has already

established UAVs as a cost-effective, agile tool for panoramic surveillance. People are only now realising that a real-time feed of a bird's-eye view, unbound by the limitations of large, expensive aircraft, has unbridled potential to serve the most crucial aspects of an investment. And when you're fighting fires, invested in saving real human lives, the capabilities of drones are thrown into even more urgency. Their involvement in firefighting has been marred by commercial models making sporadic 'interventions' in contained areas, frustrating those eager for drone restrictions to be lifted in many situations where UAVs, with the right operators, could make a big difference in aiding an emergency. Yet the positives far outweigh any reservations you can attach to them, as the best tools are justified in the right hands, leaving the opinion of drones as an annoyance looking lame and nervous next to the rewards they can reap.

▼ **Causing a buzz**
drones in firefighting.



Image courtesy of Joshua Potts



Image courtesy of Joshua Potts

▲ Are civilian drones a danger?

First, the bad news – commercial drones are a problem for fire services. Numerous reports have emerged concerning numbers of aerial support craft called down from doing their job thanks to an errant drone whipping through their airspace. Like every other wrinkle in the fabric of our lives, wildfires have a voyeuristic appeal for Joe Average: like I said, disaster on this scale is inherently fascinating, so it's hard to blame people for being curious. The hard line, however, is that flying guidelines for UAVs are not properly understood by an overwhelming amount of the public. Common sense can be lost in the smallest prospect of getting incredible camera footage; this we know, and encounter every day in blogs and news feeds, but it's still disappointing to see how emergency response teams can be undone by selfish behaviour. For example, efforts to contain a massive forest fire in Yosemite National Park this July were brought to a halt by a drone craft from an unidentified user, flying at 11,000 ft. (which is actively contemptuous of the FAA's 400 ft.-max guidelines). Support plans and tankers were grounded that afternoon as the presence of the drone added an extra element of risk to the operation. In the time it took to recall emergency aircraft, 3 ½ square miles of woodland were reduced to ash. This is not an isolated case, and seems to be percolating in the American consciousness: the FAA subsequently began promoting an awareness campaign, while the Californian

government announced they were offering a \$25,000 reward for turning in any future transgressors of UAV flight practices.

The Yosemite incident, and others in America and Australia, are representative of wider discussions that need to be brought to the public's doorstep if respect for when and where to use this technology can be instilled as an agreed-upon standard of general practise. The flip-side, though, is that drones are escaping their 'domestic hijinks' box, sneaking into the arsenal of organisations that demand information and practicality, without generating much hype in non-profit services that could be accused of underestimating their value.

So, the benefits of UAVs fall into a train of thought that can easily be derailed on misinformation or hesitation about the fairly limited testing of drones in busy, active environments. There is a lot to be considered when attaching drones to a human workforce. At least in terms of assisting fire crews, there are ways that risks can be minimised, and the advantages of drone technology can sensibly collect themselves in a bright halo of logic. Chief of these is the fact that a drone can monitor an area choked by the thick smoke rising from a fire, detecting hotspots with thermal imaging that can be used to organise a plan of attack. Manned planes or helicopters are hampered by visibility issues, like smoke clouds, that have no effect on a drone's navigation. They are able to ignore weather conditions to carry out their job, ensuring they are reliably functional in any given moment.

Concerns have been raised over

whether even one UAV could turn an emergency airspace into a nightmare for strategic co-ordination. Put simply, it is entirely possible that something could go wrong – with the drone, the operator, other planes in the sky – that means the chance for collisions is a valid worry, one that can never be dismissed. Yet it might be better (and less troublesome) to have the drones fly high above the rest of the response units, relaying data from a vantage point. It's also worth noting again that drones can fly in pitch darkness, when manned aircraft tend to be ordered home. By exploiting the adaptability of the machines, there would be no lag or lapse in cogently fighting wildfire.

Co-ordinates and data, retrieved during all hours of the day, can be filtered through programs such as FÉNIX (a monitoring system for forest fire fighting) to accurately map what territory a fire has gained or lost. Portable command centres are the next step for this innovation – ground personnel will be able to see the results of a drone flight on their smartphones, keeping the robotic and human elements in close communion with one another. There are even excited whispers that small, portable drones will soon be fitted to the backpacks of servicemen and women, a personal spy to be used at times that demand it. While the role drones could play as a physical aid to firefighters is stymied by their current weight load allowances, it's not inconceivable that deliveries of food, water, blood and other essentials could be widespread amongst them in the near future, mimicking the UAV supply drops favoured by charities in far-flung places.

After the hottest official month, globally, since records began, it is prudent for us to answer the challenges of our increasingly volatile relationship to nature. Drones, certainly, are going to be big players in the battle ahead. For more insight into UAV development and application, the SkyTech 2016 UAV conference and exhibition will be held next January in London, and I suggest anyone with even a passing interest in this field should mark their calendars now. There is so much to cherish about where we are today, just as there is much anxiety to unspool about our impact on the planet. Choose the positive route, and the latter can be dealt with.



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24-7 Commitment

Firefighters Heating Up Their Marriages With A 24-7 Commitment

It started in July 2012, as so many things do these days, as a simple blog post on the Internet. Lori Mercer, the wife of a firefighter, was celebrating the 10th anniversary of her wedding. As she reflected back on her and her husband Dan's journey, she realized just how tough it could be sometimes to be the wife of a firefighter.

There were holidays spent alone, anniversaries that came and went without more than a two minute call before the tones dropped, crying babies who didn't understand why daddy wasn't coming home for their birthday. Sometimes she didn't understand why it felt like the department came first, why he couldn't wait to go back. As she thought about their story, she wrote it down, the pain and heartache, struggles and strife, and the perks too; the fire station visits, the numerous days off in a row, and

heck, who doesn't like being married to a hero. With Dan's blessing she shared her post, and was floored with the response. Comments and emails poured in, women all over the country could relate. Women who couldn't be more different; women who were working professionals, stay at home moms, mothers of many or wives with no children, as different as they all were, they were all living the crazy life of a firefighter's wife. The responses were filled with emotion from women who were struggling; they needed to know they were not alone. And thus, Firefighter Wife was born.

Firefighter Wife began as an online community where the spouses of first responders could find fellowship and understanding. As it grew, the Mercer's discovered that all the marriage and family resources that existed for other high stress dangerous jobs (like the military) were sorely lacking for first responders. Men who are brave enough to run into a burning building are bound to have a lot of excess

testosterone with nowhere to place it. These same "hot firefighters" are surrounded by beautiful nurses and other professionals, they're surrounded by grateful members of the community; people who can't wait to tell them how wonderful they are. How then, is a marriage and family, complete with all the messiness that comes along with them, supposed to survive when the outside world seems so much more glamorous?

The organization began to offer programs such as "Marriage on Fire" and "Rescue my Marriage," in addition to other resources like "Financial Planning," realizing that there are numerous outside influences and problems that effect the marriages of first responders. The community grew through the blog and social media, and eventually became a 501(c)3 corporation in Ohio. As the scope of the organization grew to encompass more than just a community for wives, Firefighter Wife became "24-7 Commitment," and received status as a federal nonprofit. This change enables

▼ High five – firefighter Dan Mercer and his Wife Lori high five at the Commitment Weekend festivities.



Image courtesy of Adam Schienberg Photography



the organization to expand their mission to honor, encourage and support the marriages and families of first responders.

Firefighter Wife initially had about 1,000 followers in their little online community. In stark contrast, 24-7 Commitment now has over 100,000 followers on social media and email lists. Within 24-7 Commitment there are two main peer support communities: the Fire Wife Sisterhood and the Honor Guard. These communities serve to bring support, encouragement and accountability to the spouses of first responders and the first responders themselves. Honor Guard, the newer of the two communities, offers a private place for firefighters to fellowship with one another about the struggles and problems that face them in both the fire service and their home lives. Both communities offer firefighters and their spouses a place to vent, complain, confide, celebrate, find advice and talk with others who get this life. Additionally there are many sub-groups

for more personalized focus such as: Wife of the Chief, Fit Fire Wife, Fire Families with Special Needs Children, Blended Fire Families and more. Over 20 special sub-groups now exist to serve these families.

One of 24-7 Commitment's most unique programs is "Marriage on Fire." The program is the only resource of its kind, a six-week video based program designed by first responders, for first responders. The organization recognizes that marriage is *tough*; it requires constant attention and when work, kids, finances and calendars take over your life it's easy to forget that you used to get butterflies every time your spouse walked in a room. Marriage On Fire is designed to be a journey that a couple takes together that strengthens the marriages of both rookies and vets. The program focuses on six pillars: commitment, connection, confidence, communication, compassion and community. With these six things in mind, the program strengthens and builds up

▲ **"HOT for Marriage" Hands on training where couples reinforce marriage skills with firefighting drills.**

fire marriages because when a firefighter is happy and content at home, they are more productive and safe on the job. In the spirit of giving back, for every couple who purchases a Marriage On Fire annual subscription, 24-7 Commitment provides a free one-year subscription to a newlywed firefighter and their spouse, or a couple who is new to the fire service.

Each year, the organization also hosts COMMITMENT Weekends, where firefighters and their spouse participate in a weekend getaway intended to bring focus, fun and intimate moments to their marriage. So far, 3 annual weekends have been held serving over 300 people. In 2016, there will be 4 commitment weekends across the country allowing more fire couples to participate in these



Images courtesy of Adam Schierberg Photography



▲ **Marriage On Fire** presents 6 weeks of online video and challenges for firefighters and their spouse to spend intentional time on their marriage.

life changing milestone weekends. The organization is funded nearly entirely by support from individual donors. Their programs are available for purchase by fire departments and are the perfect offer especially for the newest Fire Academy recruits and new hires.

About the Founders: Lori and Dan Mercer have been married for 13 years. They met (ironically enough) at a fire station. Lori was a newly single mom with a two year old. Dan was a former member of the Marine Corps who, after trying a dozen other jobs, found his home in the firehouse. He was spending four to five nights a week at the firehouse and she was working fifty hours a week at a corporate job and

fielding toddler meltdowns. He would never date someone with kids, she was starting over, and not ready for a commitment. But when fate intervened and an old friend named Sean invited Lori and her son to the fire station to burn some energy, the stars aligned. After a two-hour conversation, they were hooked. The following day was Lori's first introduction into the life of a firefighter's spouse. Her new crush, her swoon worthy man in uniform was going on shift. Back in the day of no cell phones he'd be unreachable for 24 hours, and free again Tuesday as she headed into a full 8-hour day in the office. Two whole days with no contact; it was the first, and certainly not last, time Lori experienced some disdain for the fire service.

Fast-forward ten years: Lori (with Dan's blessing) opened up about the struggles of being married to a firefighter in a blog post. Through the responses to her post it

became clear that so many other spouses of first responders needed to hear what she had to say. They needed to know they were not alone. The community grew, and the desperate need for resources became clear. Lori and Dan poured their time, energy and resources into Firefighter Wife. It grew to become what it is today, 24-7 Commitment, serving thousands of firefighters and their spouses, strengthening their marriages and providing a safe place for them to seek advice and fellowship. Lori and Dan now have four kids, a turtle and a cat, and a community of thousands of people whose lives wouldn't be the same without their story. Lori's since left the corporate world and poured all of her free time into 24-7 Commitment, helping it to grow and increase resources.

For more information, go to www.247commitment.org



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Birmingham Airport Firefighters Praise 'Faultless' PPE

It is just over a year since firefighters at Birmingham Airport moved over to new, industry-leading protective clothing. This followed the decision to award a five-year contract to Bristol Uniforms to provide the fire service with its XFlex structural fire kit which includes TITAN 1260 fabric, a Hainsworth® Technology outershell.



Nick Mason

John McCorry, Head of Fire and Emergency Planning at Birmingham Airport, said: "Firefighters are more aware of the kit they wear than ever before. If they weren't happy, they would let me know but I can honestly say there have been no issues since the new kit was introduced just over a year ago."

John explained: "When I started out over 20 years ago, fire kit was extremely heavy and bulky, but since then there has been an enormous amount of Research and Development done to produce today's clothing which is far lighter and doesn't physically drain you."

Birmingham Airport firefighter Owen Cameron, who played a key part in the

tender process, said: "The ergonomics of the new kit are excellent allowing full movement and flexibility. It is more bespoke and fitted with garments that are fully contoured to the body. Every item of clothing has been designed to work together. The advantages of Bristol/Hainsworth were apparent straightaway."

The decision to award the contract to Bristol followed an extensive procurement process and trial period during which various firefighter PPE options were subject to a range of rigorous tests.

Each firefighter was individually measured to ensure that their garments fitted exactly to ensure maximum comfort and protection. This process was carried out across all kit including flashhoods, helmets, boots and gloves.

The contract includes responsibility for fully maintaining all garments including

▼ **Birmingham Airport firefighters are ready to respond to major incidents.**



Nick Mason is PR Consultant for Hainsworth Technology.

► **Firefighters at Birmingham Airport put their new PPE to the test.**

washing, repairing and, when required, decontamination. At the end of the five-year period, ownership of the kit will pass to BHX Fire & Rescue Ltd, which provides fire cover for the airport.

The kit procurement forms an important aspect of the overall Birmingham Airport firefighting strategy.

The airport, which saw its first flight in May 1939, has recently recorded a couple of significant milestones. On August 13th, almost 40,000 passengers passed through the airport in just 24 hours – a one per cent increase on the previous busiest day in August 2005. Meanwhile, latest figures show that over 10million passengers used the airport in the previous 12 months, another record.

The airport serves more than 140 direct scheduled and chartered routes as well as an additional 280 possible connections worldwide. Around 50 different airlines now operate out of the airport.

The changing role of firefighters means the four watches at Birmingham Airport have never been busier. Last year, they dealt with 240 call-outs and they had almost matched that number after just eight months of this year.

Around half of all calls are now medical-related, a number which is likely to grow. Birmingham Airport has just signed a memorandum of understanding with West Midlands Ambulance Service (WMAS). Firefighters will respond to airside locations as part of a co-responder scheme. The scheme will benefit WMAS in effectively having a resource on site. Firefighters have also benefited from newly acquired skill sets delivered by WMAS. Ultimately, the wider travelling public and airport community will also benefit.

John McCorry said: "Interoperability is the key today, working closely with our colleagues at the airport and partners such as the ambulance, fire and police services. With 112,000 air traffic movements a year we have to be ready for potentially big incidents."

When they are not responding to incidents, the 50-strong team have a multitude of other tasks to perform including the regular testing of more than 900 individual pieces of kit. They are also running an increasing number of courses

including fire training and First Aid, for cabin crews and a range of external commercial customers.

The emphasis on best practice in everything they do is further highlighted by the five state-of-the-art Oshkosh Striker firefighting vehicles that are transforming the way airports tackle fires. Birmingham became the first UK airport to take delivery of the vehicles, which are not only the most advanced firefighting truck but also environmentally friendly.

Three of the vehicles have extended boom technology, called Snozzles, which can penetrate an aircraft fuselage in the event of an aircraft incident, allowing direct close range access to an on-board fire. The movement of the Snozzle is computer controlled from inside the Striker cab using a joystick with cameras providing detailed imagery from the Snozzle. Each appliance is equipped with hydrochem fire nozzles that can discharge water and dry powder simultaneously.

John McCorry said: "Everything we do is about working as smartly, effectively and efficiently as possible.

"This joined-up approach can be seen in every decision we make as a fire service. We believe we have the best training programme, regulated by the Civil Aviation Authority, the best firefighting vehicles and the best kit for our firefighters to wear."



Images courtesy of Hainsworth



Simon Burnett-Boothroyd, Sales and Innovation Executive for Hainsworth Technology, said: "Birmingham Airport is a shining example of best practice in UK firefighting across everything they do. During the last couple of years we have had the pleasure of watching how they go about their business. We are delighted they selected Bristol and Hainsworth as their PPE partners after a rigorous selection process and equally pleased with how the kit has performed during the past 12 months."



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The Changing Role of the Rescuer

I joined the fire and rescue service nearly a quarter of a century ago and since that time the industry has changed beyond all recognition. The only thing I identify with now is the history and tradition that will, quite rightly, be ever present. Everything else is radically different and the industry has not just evolved but has revolutionised itself during this time. This has been a global transformation with seemingly no service untouched.



Ian Dunbar

At the heart of this revolution, without doubt, is the ever changing role of the rescuer and the expectations placed upon them. A complete change of focus has seen reactive 'brigades' turn into proactive 'services' with the emphasis on prevention rather than cure. In many parts of the world this has equated to a dramatic reduction in the number of operational incidents that require a response. Over the same period however, rescuers have had to become more adept at dealing with a wider range of incidents than ever before. At the same time they have to develop their core skills to deal with the 'usual' types of incidents associated with their role. So whether it is the ability to react to 'contemporary' issues such as the ruthless forces of nature, terrorism or the challenges presented by new construction in buildings and vehicles, the operational landscape has changed forever.

More advanced skills and tools

One of the first things I had to do as part of my basic training as a firefighter in 1992 was to be able to name, locate and describe every item of equipment on the rescue vehicle. This was quite an achievement; or so I thought. Fast forward to 2015 this is now a far more daunting task. Not only is there far more equipment to find and to list, but it is also far more technologically advanced and less 'agricultural' in its design and construction. Modern day rescue operations demand specialised equipment that is designed for the task in hand. None more so than hydraulic rescue equipment, which has changed radically in the last 25 years. A seemingly small design change or improved construction method can greatly affect a tool's operational performance.

▼ The newest spreaders used for vehicle extrication are lighter and more powerful than ever.

Ian Dunbar is Rescue Consultant at Holmatro. Before joining Holmatro he was a Training Officer in the UK Fire and Rescue Service with a background in both technical as well as medical rescue. Ian provides Consultation and Training to emergency services departments around the world.



Image courtesy of Holmatro



Image courtesy of Holmatro

▲ The pump-hose-tool configuration is still seen as the industry standard.

The same time period has also witnessed a huge change in the construction of vehicles from which people have to be rescued, while the basic extrication techniques haven't massively changed. So rescuers have had to refine their skills to face up to the newer more challenging vehicles. Thankfully, the latest generation of hydraulic rescue equipment provides the rescuer with everything they need in order to overcome this in a safely, effectively and timely manner. It is fair to say that both our rescue tools and our skills have advanced further and more rapidly than vehicles, allowing the rescuer to stay ahead of the game.

How to make the right choice

There has never been so much choice when it comes to hydraulic rescue equipment, with each tool performing a different role in rescue operations. In an effort to make things clearer, let's take a closer look at what is available and what is used popularly across the world.

The first choice comes with deciding a power source. It is generally a straight shootout between a pump-hose-tool configuration and self-contained equipment, which can be either powered by a battery or by the operator's hand. The pump-hose-tool configuration may be a portable pump with hoses (personal power) or a fixed pump on a vehicle with hose reels that can be deployed

at the scene directly from the vehicle. Each configuration allows for dedicated tools (cutter, spreader and ram) and will offer the rescuer a different set of options on scene. It is simply a case of weighing up the perceived operational pros and cons that are associated with each set configuration.

The most important thing to consider is application. Who is using the equipment, what are they using it for and in what kind of conditions? Also consider your requirements for specialist applications such as rapid intervention. There is no right and wrong answer here; it is all about the needs of the user.

Popular power sources

- **Portable pump (gasoline/battery/hand/diesel) + hose + tool**
This configuration is still the 'industry standard' with the overwhelming majority of sets being configured this way. Pump can have several types of power sources depending upon individual requirements
- **Fixed pump on vehicle (PTO/Electric) + hose/hose reel + tool**
This is very popular in certain countries around the world.
- **Self-contained tool (battery or hand powered)**
This has been the emerging technology over the last 5 years or so. More and more rescue services are now exploring this option.

Dedicated rescue tools and set configurations

Now let us look at individual tools, their principal use and how they can be configured into a rescue set. There is no ideal rescue set composition as this depends on the nature of the required need of the user. The majority of rescue sets are sources for light vehicle rescue (i.e. cars and smaller vehicles). When looking at the composition of a set it is important to remember the overall weight as this may have an impact on the vehicle.

- **Dedicated cutter (designed with new vehicle construction in mind)**
Hydraulic cutters are primarily used for space creation and considered to be the most important tool. Usually dominates conversations and any equipment evaluation due to new car construction.
- **Dedicated spreader**
Hydraulic spreaders are primarily used for gaining access and creating space. They are often assessed on spreading force and opening.
- **Dedicated rams**
Hydraulic rams are available in a wide range of sizes and are used for internal space creation.
- **Dedicated mini cutter**
A hydraulic mini cutter and/or pedal cutter generally completes a rescue set.



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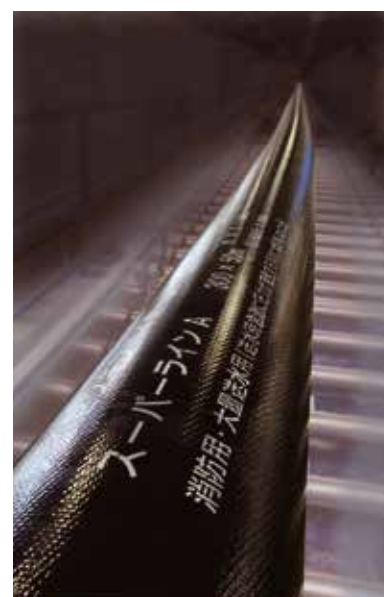
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Weight	kg/m	1.1	1.6	2.8	4.0	4.8
Burst pressure	MPa	4.2	4.4	3.6	3.0	2.8
Maximum working pressure	MPa	1.6	1.6	1.4	1.4	1.4
Temperature range	°C	-20°C ~ 50°C				



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of lifting. Hydraulic struts can be used for a wide range of applications from the stabilising of small vehicles to lifting trucks to providing emergency shoring for rescue from collapsed buildings or trenches. Small combi tools are not only used at the side of the road, but also by Special Forces who routinely jump out of aircrafts. Suffice to say that the once defined lines between tools, their operators and applications are now very blurred with a whole host of equipment available to all agencies.

Summary

The choice of any individual tool often starts with a study of numbers. But while paper-based specification is important, the key here is operational performance: Does it do what you want it to do? Is it well balanced, light and ergonomic and is it designed with the desired application in mind? Is it innovative and does it offers something unique that either makes the role of the operator safer and easier and as a consequence, more effective?

The role of rescuers has changed drastically in the last quarter of a century. In addition to the core competences that rescuers have to maintain, they themselves and their organisations have to find new and innovative solutions to the latest operational questions that are asked of them. This requires new and innovative equipment which thankfully has also evolved at a considerable pace over the same timeframe.

As for hydraulic rescue tools, while there is a myriad of equipment available, one thing is for sure; rescuers should look firstly at the desired application and choose the most appropriate solution based on operational need and characteristics such as safety, weight, balance and ergonomics. Think about just how, where, by whom and in what kind of conditions those applications are to be carried out. Look at all of the options available and compare as much equipment as possible; the composition of a rescue set can be precisely what you want it to be. From an equipment point of view, there has never been a better time to be an operational rescuer, of course that is providing you still don't have to name, locate and describe every item of equipment on the vehicle.

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▲ A dedicated cutter is designed with new vehicle construction in mind.

Heavy rescue tool set

Historically we have tended to think of larger tools when it comes to 'heavy rescue', but we must look closely at the precise nature of the application when it comes to deciding the composition of the rescue set. Heavy rescue operation often involves working at height, access can be difficult and we very often have restricted space to work in. So the working environment should be considered along with our desire for larger heavier tools. Heavy rescue very often comprises:

- Dedicated cutter (designed with new vehicle construction in mind)*
- Dedicated spreader*
- Dedicated ram(s)*
- Dedicated mini/pedal cutter

*For heavy rescue, tools with a larger capacity (than for light vehicle rescue) are often favoured.

Another tool to consider is the:

- Combi tool (or combination tool)

This is a tool which provides capacity for cutting and spreading and is often used for rapid intervention (initial attendance at a road traffic collision, often to gain access and initially stabilise the patient). The combi tool is also the tool of choice for other 'specialist' application due to its relative small size, light weight nature and operational flexibility.

Vehicle extrication and beyond

We have already discussed that the role of the rescuer has expanded and as a consequence the use of hydraulic rescue equipment has broadened. The ability to use hydraulics to cut, spread, squeeze or lift is now also well established in other disciplines such as urban search and rescue, mine rescue and specialist operations within the Special Forces around the world. For this reason, some of the most popular rescue tools have migrated into this field of operations and likewise some specialist equipment that has been designed for niche markets is now used routinely by rescuers worldwide.

Tools such as power wedges are now commonly used for assisting entry as well as assisting with the initial stages

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A Safer Approach to Water Rescue

The Emergency services in the UK respond to an ever increasing frequency of major flood and water rescue incidents events. If we look at the statistics we can see there were a total of 381 drowning and water-related deaths from accidents or natural causes across the UK in 2013, according to a report published by the National Water Safety Forum (NWSF). There were 260 deaths in England, 56 in Scotland, 41 in Wales and 11 in Northern Ireland. In England, the South West (53) and the South East (50) regions had the highest number of deaths. So the need for Emergency Services and support teams cannot be underestimated.



Jo Taylor



Kevin Howlette

**Jo Taylor – Business Owner
at Reach and Rescue Ltd.**

**Kevin Howlette – Managing
Director – Emergency Fire
and Safety Ltd.**

Water rescue incident management must be able to adapt from generic major emergency procedures to specialised flood rescue response. During these emergencies effective and safe operational decision-making depends upon a thorough understanding of existing water rescue procedures and an ability to work closely with partner agencies. Emergency managers need a broad set of skills to meet these challenges to ensure a high degree of operational assurance.

As a swift water rescue scene evolves, the Incident Command System (ICS) will emerge. ICS is a national protocol used for managing emergencies.

▼ **Environmental Agency training
with Wading Poles and Throwlines.**

The response team may be drawn from multiple agencies that do not routinely work together, and ICS is designed to give standard response and operation procedures to reduce the problems and potential for miscommunication on such incidents. All rescue operations demand vigilance with regards to safety. ICS provides that a Safety Officer be present to monitor and address all safety issues. One of these issues pertains to the incident scene.

Zones of operation

The immediate area of operations at the incident is divided into three zones of operation, “Cold”, “Warm”, and “Hot”. Certain requirements regarding training and personal protective equipment (PPE) exist for personnel operating within these three zones. The Cold Zone is considered



Image courtesy of Reach and Rescue Ltd.



Images courtesy of Reach and Rescue Ltd.

▲ **Reach and Rescue Pole in action**
Ostrava Fire and Rescue, Czech Republic
(above). X-Runner Event Safety (bottom
right). Demonstrating the impressive
17m reach capability (top right).

to be anything greater than 15 feet (4.6 m) from the water's edge. Awareness Level personnel shall approach no closer than the Cold zone. The Warm Zone begins 15 feet (4.6m) from the water's edge, and ends at the water's edge. Personnel operating in the Warm Zone shall be trained to the Operations Level, and must wear a properly fitted and secured personal flotation device (PFD). The Hot Zone refers to any and all activities taking place in the water. These activities shall be performed by personnel trained to the Technician Level, provided they are wearing a properly fitted and secured personal flotation device.

Risk Algorithm

In order to provide for the safety of both the rescuer and victim, a low to high risk algorithm has evolved for the

implementation of various rescue methods in Swift Water Rescue. Under times of stress, the implementation of this algorithm helps to prevent a rescuer from endangering himself and the victim, thus providing a sound, step by step approach when affecting a rescue. As the algorithm progresses, the danger and threat to rescuer and victim increases.

The algorithm called the Rescue Formula is, "Shout", "Reach", "Throw", "Go", "Helo", (this has been changed due to the increase safety of helicopter operations and the increased deaths of rescuers in boats). While it is safest to talk a victim into performing a self-rescue, there exists a substantial increase in danger once a rescuer enters the water.

"Shout" refers to the dialogue that takes place between the rescuer and victim, and includes the rescuer directing the victim in methods of self-rescue, such as swimming to shore. If unsuccessful, the rescuer will attempt to "Reach" with an object, such as a tree branch (if available), paddle (if available), or a telescopic pole to the victim, so that the victim can be

pulled to safety or at least held until further rescue personnel are on the scene. "Throw" is using a bag with a floating line inside which is thrown and held on to by the causality for them to be pulled to safety. If this is unsuccessful, then "Go" is simply the rescue personnel entering the water and risking their life. It has only been the last couple of years that new innovative technology being a telescopic lightweight rescue pole has become available to "Reach" which is stopping rescuers from risking their own lives in the dangerous waters and enabling first responders to rescue at the scene saving time thus saving lives.

This rescue formula will allow all levels of water rescue teams set the limits as to where they are able to respond. From an industrial level teams will only go to "REACH AND THROW" where most emergency services will be able to commit to all levels.



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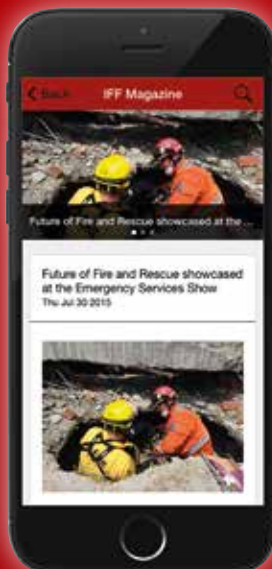


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